WWTP Facilities Plan

Yorkville Utility District No. 1

Village of Yorkville, WI

146260 | July 29, 2020

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WWTP Facilities Plan

Village of Yorkville, WI

Prepared for:
Village of Yorkville Sanitary Utility District No. 1
Yorkville, WI

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I, Dan Schaefer, PE, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

	40481-6	July 29, 2020
Dan Schaefer, PE, PE Senior Professional Engineer	PE Number	Date

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Village of Yorkville Utility District No. 1

Prepared for Village of Yorkville Sanitary Utility District No. 1

1 Background Information

1.1 Need for Proposed Project

The Village of Yorkville (Yorkville) has seen a number of unique and significant events that have occurred over the last five years that are relevant to determining the most cost effective alternative for sewer service for Yorkville with respect to Wis. Adm. Code sec. NR 110.09 and applicable DNR guidance. The applicable rules and guidance require the consideration of not only the monetary costs of each available option, but also fiscal and other nonmonetary considerations that must be considered in making a determination of the most cost effective option to serve the sewer treatment needs of the Village.

A brief summary of these unique and significant events that are relevant to making a proper determination of the most cost-effective alternative for sewer service for Yorkville include the following:

1. No significant improvements had been completed at the existing wastewater treatment facility (WWTF) since its original construction in 1982, with the exception of a new fine screen and regular WWTF maintenance. This was primarily due to the assumption that at some point the facility would regionalize once the Racine area service area expanded to the point the Yorkville facility could be cost effectively decommissioned.
2. Following the original design and construction new limits for ammonia were added to subsequent permit issuances. While the facility generally maintained compliance, the addition of ammonia limits effectively reduced the overall capacity of the facility.
3. The previous WPDES permit issued on February 1, 2013 included a compliance schedule for water quality based effluent limits for total phosphorus. The Village (Town at the time) submitted each of the four required annual phosphorus reports, with the Final Compliance Alternatives Plan being submitted on June 29, 2017 with a revision submitted on October 24, 2017. The Final Compliance Alternatives Plan compared several options for upgrading the existing facility to comply with future limits, as well as two regional alternatives on both a present worth and fiscal cost basis. Each of the alternatives developed was shown to impact residential rate payers to the point that the Multi-Discharger Variance (MDV) for phosphorus was justified, and the MDV was recommended, and requested during the permit application process.
4. Yorkville submitted its WPDES permit renewal application in June 2017.

5. Foxconn announced a major development to occur along the east side of I-94 in neighboring Mount Pleasant of October 4, 2017. As a result of this announcement, Town of Yorkville staff and consultants participated in several months of meetings with Mount Pleasant, Racine and other parties to the Racine Intergovernmental Agreement for wastewater, to determine the cost effectiveness of future participation by Yorkville to receive sewer and water service from the City of Racine.
6. A Notice of Violation (NOV) was received on October 24, 2017 for BOD, TSS, Ammonia, and chlorides. NOV related correspondence is included in Appendix A of this report.
7. WDNR conditionally approved the MDV for phosphorus on November 21, 2017.
8. In the Fall, 2017, and prior to the incorporation of the Town as a Village, the Town of Yorkville was invited to participate in ongoing negotiations for the Town's participation in a regional sewer and water system offered by the Racine Wastewater Commission and Racine Water Utility that would serve the new proposed Foxconn development located in the Village of Mr. Pleasant. During the three months that followed, Town representatives were involved in intensive negotiations with the Village of Mount Pleasant, Racine County, the Racine Wastewater and Water Utilities and state officials on this potential regional service option. These discussions culminated in a decision by the Town Representatives on January 21, 2018 that the regional solution was not cost effective. The detail of the reasons for that decision are contained in greater detail on Appendix B.
9. After the Town's decision that the regional solution was not cost effective, the Town convened a meeting on March 20, 2018 with representatives of SEWRPC, DNR and County officials to explain its decision to terminate the regional solution as not cost effective and discussed the option of continuing to provide its own sewer treatment facilities to meet its development needs as the most cost-effective solution under the circumstances (the "Stand Alone Option"). At this meeting, officials were generally supportive of this decision and outlined at the meeting the process necessary for the Town to seek necessary approvals for continuing to utilize the Stand Alone Option. The March 20, 2018 meeting is described in greater detail in Appendix C.
10. The Town held a referendum to formally incorporate as a Village on April 3, 2018 which was approved and, on April 9, 2018 the Clerk certified the referendum results and on April 18, 2018, the Secretary of the Wisconsin Department of Administration issued a Certificate of Incorporation recognizing Yorkville's legal status as the Village of Yorkville.
11. The Village prepared and submitted an NOV Response Plan to WDNR on October 1, 2018. This plan identified an alternative that achieves compliance with NOV related exceedances for BOD, TSS, & ammonia that included the most cost effective alternative from the previous Final Compliance Alternatives Plan with the exception of tertiary filtration required for future phosphorus limits. The recommended improvements consisted of a new Sequencing Batch Reactor system and other related improvements.
12. WDNR subsequently concurred with the recommendations found in the NOV Response Plan via a letter transmitted on November 11, 2018.
13. The Yorkville WPDES Permit was reissued with an October 1, 2019 effective date and is included as Appendix D to this report. The new permit included the MDV for phosphorus, as well as more restrictive ammonia limits. The facility upgrade compliance schedule contained in the permit, was reduced from the originally discussed and anticipated 2-year schedule, to include a new compliance date of July 1, 2021.

14. On October 11, 2019, the Village convened a meeting with DNR and SEWRPC officials to discuss, in greater detail, the process for DNR and SEWRPC approvals and timelines associated with those necessary approvals. The summary of the meeting and timelines associated with the approvals are described in greater detail in Appendix E.

This facilities plan is intended to formalize the alternatives analysis conducted over the last five years of planning as noted above, while complying with NR110 requirements, and the NOV compliance schedule contained in the current WPDES Permit. While the permit does not specifically call for a facility plan submittal ahead of plans and specifications for the recommended NOV improvements, this plan is being submitted to incorporate all of the various aspects previously reviewed.

1.2 Abbreviations

The following list of abbreviations may be used in this report:

ADF	-	Average Daily Flow
BOD	-	biochemical oxygen demand
BPR	-	Biological Phosphorus Removal
cfm	-	cubic feet per minute
cu ft	-	cubic feet
DOA	-	Department of Administration
ft	-	feet
gpd	-	gallons per day
gph	-	gallons per hour
gpm	-	gallons per minute
gpcd	-	gallons per capita per day
MBR	-	membrane bioreactor
MGD	-	million gallons per day
mg/L	-	milligrams per liter
NH3-N	-	ammonia nitrogen
NOV	-	Notice of Violation
O&M	-	Operation & Maintenance
P	-	phosphorus
PE	-	population equivalents
ppd	-	pounds per day
RAS	-	return activated sludge
SBR	-	sequencing batch reactor
SEWRPC	-	Southeastern Wisconsin Regional Planning Agency
sq ft	-	square feet
SSA	-	sewer service area
SWD	-	side water depth
TDH	-	total dynamic head
TKN	-	total Kjeldahl nitrogen
TP	-	total phosphorus
TSS	-	total suspended solids
UV	-	ultraviolet
VSS	-	volatile suspended solids
WAS	-	waste activated sludge
WDNR (DNR)	-	Wisconsin Department of Natural Resources

WWTP	-	wastewater treatment facility
WPDES	-	Wisconsin Pollutant Discharge Elimination System
WW	-	wastewater

1.3 Planning Area

The Town of Yorkville approved an ordinance adopting the Multi-Jurisdictional Comprehensive Plan for Racine County: 2035 as the Town's comprehensive plan which now constitutes the Village's Comprehensive Plan pursuant to Wis. Stat. Section 66.0213(2). The Village of Yorkville is amending the existing Comprehensive Plan to take into consideration current economic trends and village infrastructure conditions and has developed the proposed "I-94 Corridor Master Plan" which includes recommended future land uses for the I-94 Corridor, future development recommendations, and a revised Sanitary Sewer Service Area within this corridor (south of 50th Rd and north of 58th Rd. The Village's Plan Commission, by majority vote of the entire Commission at a meeting held on December 16, 2019 recommended to the Village Board the adoption of the I-94 Corridor Master Plan, including recommended future land uses for the I-94 Corridor and Sanitary Sewer Service Area, as an amendment to the Village's Comprehensive Plan.

In order to both address the NOV's and prepare Yorkville for 20-year growth, a recommended Sewer Service Area (SSA) boundary was developed and will be used as a basis for sizing unit process treatment alternatives in this plan. The current area served by the WWTP will be extended to further south to account for additional acreage south of the existing Grandview Industrial Park. Appendix F presents a map indicating the proposed 20-Year SSA. This SSA was also approved by the Village Board on December 16, 2019, and also submitted to Southeastern Wisconsin Regional Planning Commission (SEWRPC) for their approval and use in preparing a 1st Edition SSA Plan for the Village of Yorkville. The 1st Edition SSA is anticipated to be completed in the summer of 2020, and will be included as Appendix F to this report.

1.4 Environmental Setting

The environmental setting within the Village was reviewed in SEWRPC's Community Assistance Planning Report No. 277 "A Land Use Plan. Chapter 3 of the Land Use Plan for the Village of Union Grove and the Town of Yorkville: 2020, and is included in Appendix G. The following items were included in the environmental setting review:

- Soils
- Topography
- Watershed Features & Drainage
- Surface Water Resources
- Bedrock
- Natural Areas and Critical Species Habitat Sites
- Wetlands & floodplains
- Wildlife, forest land, natural areas & endangered/threatened species
- Environmental Corridors & Isolated Natural Resource Areas

1.5 Demographic & Land Use Information

Following incorporation of the Town of Yorkville in April 2018, land use within the Village was as follows: Appendix G presents the existing land use within the Village as identified in the draft Comprehensive Plan.

Table 1 – Yorkville Land Uses: 2012 – 2017

Real Estate	2019		
	Parcel Count (Total Land)	No. of Acres	Percentage of Total Acres
RESIDENTIAL - Class 1	1,024	2,988	15.0%
COMMERCIAL - Class 2	164	752	3.8%
MANUFACTURING - Class 3	12	96	0.5%
AGRICULTURAL - Class 4	466	14,097	70.9%
UNDEVELOPED - Class 5	233	1,182	5.9%
FOREST LANDS - Class 6	51	424	2.1%
OTHER - Class 7	103	345	1.7%
TOTAL - ALL COLUMNS	2,053	19,884	100.0%

Source: WI Department of Revenue, Final-Equated Statement of Assessments for 2019

2 Existing Conditions

2.1 Collection System Description

The Yorkville Sanitary District No. 1 includes 7 miles of sanitary sewer and 2 remote lift stations and associated force mains. Yorkville is also in the process of implementing CMOM program activities as discussed in the 2018 Compliance Maintenance Annual Report (CMAR).

2.2 Description of Existing Wastewater Treatment Facilities

The existing facility was constructed in 1982, the facility consisted of the following:

1. Lift Station
2. Comminutor
3. Aeration Basin with Mechanical Aerators
4. Final Clarification
5. Aerobic Digester
6. Laboratory and Maintenance Building

The treatment plant was designed for extended aeration activated sludge with the following design rating:

Average Daily Flow	=	150,000 gpd
Average BOD Loading	=	255 ppd
Average TSS Loading	=	278 ppd

2.3 Unit Process Age, Condition & Capacity Deficiencies

The following sections describe the age, condition and capacity related deficiencies of the current WWTP, with a specific focus on deficiencies that impact NOV's observed.

2.3.1 Preliminary Treatment

Both the influent lift station and comminutor have been replaced since the original construction in 1972. Further detail on each project is provided below. There are currently no age, condition, or capacity related issues with either the influent lift station or influent fine screen unit processes.

Influent Lift Station – Rebuilt in 2018, new controls in 2004

Influent Lift Station upgrades included a complete rehabilitation of the existing lift station including pumps, valves and controls.

Influent Fine Screen Installation – Approximately 2011

The comminutor was replaced with an inclined fine screen equipped with an integral screening washer/compactor. The new fine screen is located outside adjacent (west) to the aeration tank. Both the influent pump station have remaining useful life and are in good operating condition. Though, the lift station pumps will need to be replaced to meet both new hydraulic conditions the growth that is expected. Each also has adequate capacity to screen and convey current peak flows. The existing fine screen will reach the end of its original service life during the 20-year planning period, and an in-kind replacement will be included in alternatives that include fine screening at the Yorkville WWTP.

2.3.2 Secondary Treatment

The aeration tank operates in conjunction with the final clarifier to provide secondary treatment. Effluent from the fine screen flows to the aeration tank by gravity. Vertical shaft mechanical aerators with dual impellers mix and aerate the wastewater to provide oxygen for BOD and ammonia removal. These aerators are two-speed with configurations for both summer and winter aeration. Aeration is controlled by a DO probe. The west aerator is typically in the lead position and operates based on DO demand. The center aerator runs at constant low speed and the East aerator is also controlled by the DO probe and is in the lag position.

With only one aeration tank, WWTP operations staff has never been able to take the tank out of service to inspect both the tank structure and the mechanical condition of the aerator shafts and impellers. Only preventative maintenance has been performed on the aerators to date. The mechanical aerators are operating well beyond their original useful design life.

In the aeration tank, raw wastewater is mixed with active aerobic microorganisms (activated sludge) in an aerobic environment. Air is introduced into wastewater by the mechanical aerators maintaining an aerobic environment in the aeration tank to satisfy the biochemical oxygen demand. The aeration system is controlled by a DO probe to maintain a minimum DO of 2.5 mg/L. The activated sludge is settled in the final clarifier and returned to the aeration tank as return activated sludge (RAS) or wasted to the aerator digester as waste activated sludge (WAS).

The primary function of the aeration tank is BOD reduction to provide acceptable effluent. The long detention time of extended aeration will, after initial BOD reduction, also convert ammonia nitrogen to nitrate nitrogen (nitrification) and accomplish considerable aerobic digestion (volatile solids reduction). Recently the tanks ability to nitrify in winter months has been inconsistent leading to several exceedances for ammonia.

Solids settled in the clarifier are continuously removed by gravity and returned to the aeration tank through lower ports in the common wall of the aeration tank and clarifier. No control over RAS rates is afforded the operator leading to periodic clarifier upsets, and difficulty preventing nitrifier washout during peak events.

Final effluent flows over the weir in the final clarifier and through the old chlorine contact tank, and over the outfall weir. No disinfection is required at the WWTP.

The clarifier has undergone multiple complete rebuilds with the most recent occurring in 2014. As of 2016 Yorkville began monthly servicing on the clarifier in addition to regular maintenance. The additional maintenance service is to help with the BOD exceedances and has a cost of $3,000 per month.

Current clarifier limitations will make compliance with the Village's current NOV's more difficult. There were various exceedances of BOD in the winter months and multiple exceedances of ammonia and TSS. The final clarifier shares a common wall with the aeration tank which does not allow for proper control of the sludge blanket by adjusting RAS rates, as RAS only flows by gravity. The lack of sludge blanket control has also lead to problems with the facility's TSS.

Based on the deficiencies of the activated sludge system indicated above, it is recommended that any future treatment improvements to address the NOV also included upgrade and replacement of all or portions of the existing package plant. Some of the package plant structure may be reused for other purposes. Retrofitting the existing package plant is discussed in the alternatives analysis found in Section 4.

2.3.3 Disinfection

Disinfection is not required at the Yorkville WWTP based on the classification of the receiving water.

2.3.4 Solids Handling

WAS is removed from the final clarifier and aeration tank to the aerobic digester by gravity. Aerobically digested sludge is stored in the aerobic digester until a contract hauler removes the sludge for storage and/or land application. The aerobic digester is equipped with provisions for decanting to reduce the water volume hauled during contract hauling.

Prior to implementation of Sorb-X for phosphorus removal at the WWTP, the existing aerobic digester provided limited potential for decanting to reduce total sludge volumes requiring disposal. Additional digestion and sludge storage volume is desired to reduce the frequency of sludge hauling. The existing package plant can be modified to provide additional digestion and sludge storage.

2.3.5 Laboratory & Maintenance Building

The laboratory & maintenance building houses the laboratory, MCC's, and other maintenance supplies for the WWTP. The backup generator is installed outside adjacent to the laboratory and maintenance building. The current electrical room does not have any additional capacity for new electrical equipment or control panels; thus a new electrical room would be needed for any additional unit treatment processes if the facility were to upgrade. A new administration/laboratory room and electrical room will be included as part of the new treatment building developed in Alternative 1. The existing Laboratory and Maintenance Building will be further evaluated to determine potential future uses depending on the Alternative recommended as part of this facility plan.

2.3.6 Summary of Unit Process Deficiencies

There are numerous deficiencies at the WWTP which combined to lead to many of the NOV's experienced. Many of the deficiencies are due to the original design of the facility. The deficiencies include:

- Original design capacity was based on organic (BOD) removal only (no nitrification)
- Lack of ability to control WAS rate & SRT
- No RAS pumping, lack of sludge blanket control
- Poor Tank Geometry (aeration tank & clarifier have sloped sidewalls)
- Inconsistent winter nitrification due to the above bullets
- Limited aeration control
- Lack of redundancy
- Lack of MCC space for new motor starters
- Site space limitations
- Age of Infrastructure

Alternatives developed in Section 4 of this report will be developed to address the above deficiencies to eliminate future NOV's.

2.4 Current Flows & Loadings

Four years of operating data (2016 through 2019) from the Yorkville WWTF was reviewed. The recorded influent characteristics for the four years are summarized in Table 2. The estimated current year conditions were calculated to reflect an existing influent condition at the WWTF. The average annual values for flow and loadings were calculated based on the average of the four years of data. Maximum month, maximum week, and peak day values were determined by selecting the respective maximum for each constituent from the four years of review.

Table 2 – Recorded Influent Characteristics

Characteristic	Units	2016	2017	2018	2019	Current Year Estimate
Minimum Month Flow	MGD	0.051	0.053	0.055	0.063	**0.051**
Average Annual Flow	MGD	0.065	0.065	0.069	0.081	**0.070**
Maximum Month Flow	MGD	0.086	0.081	0.087	0.095	**0.087**
Maximum Week Flow	MGD	0.105	0.102	0.123	0.121	**0.113**
Peak Day Flow	MGD	0.15	0.18	0.17	0.17	**0.165**
Average Annual BOD5	lb/d	106	122	95	124	**112**
Maximum Monthly BOD5	lb/d	138	183	145	142	**152**
Peak Day BOD	lb/d	287	342	379	326	**334**
Annual Average TSS	lb/d	77	78	56	70	**69**
Maximum Monthly TSS	lb/d	128	149	78	98	**113**
Peak Day TSS	lb/d	349	402	322	301	**344**
Average Annual Phosphorus	lb/d	2.59	3.45	2.53	2.79	**2.84**
Maximum Monthly Phosphorus	lb/d	3.76	5.73	4.02	3.73	**4.31**
Peak Day Phosphorus	lb/d	8.83	11.35	16.92	8.53	**11.41**

2.5 Existing Facility Effluent Quality & NOV's

The following sections provide effluent summaries for BOD, ammonia, TSS and chlorides. Also included are discussions of NOV's received for each constituent. NOV correspondence is included in Appendix A.

2.5.1 BOD

There were 8 exceedances between January 2016 and July 2017, primarily in winter conditions. Effluent BOD averaged 6.95mg/L with a range from 0.01 to 95 mg/L in 2015. Effluent BOD averaged 17.61mg/L with a range from 2 to 200 in 2016. Yorkville's current WPDES allows for a weekly BOD average of 30mg/L and a monthly average of 20mg/L. Table 3 presents a list of all NOV's for BOD. The facility has been spending $3,000 per month on additional maintenance to aid in BOD reduction.

Table 3 – BOD Exceedances

Date	Result Amount	Description	Limit Amount
01/03/2016	67.1 mg/L	Monthly Average	20 mg/L
01/03/2016	51 mg/L	Weekly Average Limit	30 mg/L
01/11/2016	39 mg/L		30 mg/L
01/17/206	30 mg/L		30 mg/L

Table 3 – BOD Exceedances

Date	Result Amount	Description	Limit Amount
01/25/2016	115.3 mg/L		30 mg/L
04/04/2016	22.1 mg/L	Monthly Average	20mg/L
05/01/2016	31.5 mg/L	Weekly Average Limit	30 mg/L
07/24/2017	93.7 mg/L		30 mg/L

2.5.2 Ammonia

There were 22 ammonia exceedances from February 2014 to January 2017. Ammonia exceedances are listed in Table 4. The WWTP was originally designed for BOD removal only, as the original facility was intended to be an interim facility. Subsequently, ammonia limits were added to the permit, and the WWTP has problems with nitrifying in winter conditions even though the facility operates at approximately 50 percent of the original design flow capacity. Year-round nitrification is also inhibited by the lack of RAS pumping and control of WAS flow rates. To combat ammonia problems with cold temperatures operations staff at the facility have attempted to increase mixed liquor concentrations in the fall.

Table 4 – Ammonia Exceedances

Date	Result Amount	Description	Limit Amount
02/17/2014	11.8	Daily Maximum Limit	11.4 mg/L
01/10/2015	17.5		11.4 mg/L
01/11/2015	16.3		11.4 mg/L
02/16/2015	12.5		11.4 mg/L
02/17/2015	15.4		11.4 mg/L
02/23/2015	27.1		11.4 mg/L
02/24/2016	25.7		11.4 mg/L
03/2/2015	26.6		11.4 mg/L
03/3/2015	24.4		11.4 mg/L
03/10/2015	19		11.4 mg/L
01/3/2016	12.9	Monthly Average	12.4 mg/L
01/17/2016	19	Daily Maximum Limit	11.4 mg/L
01/18/2016	15.6		11.4 mg/L
01/25/2016	20.9		11.4 mg/L
01/27/2016	19.5		11.4 mg/L
02/3/2016	12.9		11.4 mg/L

Table 4 – Ammonia Exceedances

Date	Result Amount	Description	Limit Amount
12/15/2016	12.6		11.4 mg/L
12/19/2016	14.5		11.4 mg/L
12/20/2016	16.8		11.4 mg/L
12/21/2016	18.1		11.4 mg/L
01/9/2017	23		11.4 mg/L
01/10/2017	16.9		11.4 mg/L

2.5.3 TSS

There were 6 TSS exceedances at the WWTP between December 2015 and May 201, these exceedances are listed in Table 5. Yorkville's WPDES permit limit for TSS is 40mg/L for a weekly average and 20 mg/L for the monthly average. The existing final clarifier shares a common wall with the aeration tank and has ports located at the bottom to convey RAS back to the aeration tank. Due to the ports in the tank there is no control over the facility's sludge blanket through RAS pumping.

Table 5 – TSS Exceedances

Date	Result Amount	Description	Limit Amount
12/01/2015	25.3 mg/L	Monthly Average	20 mg/L
12/08/2015	33.9 mg/L	Weekly Average	30 mg/L
01/03/2016	41.4 mg/L	Monthly Average	20 mg/L
01/10/2016	56.5 mg/L	Weekly Average Limit	30 mg/L
01/17/2016	39.7 mg/L		30 mg/L
05/01/2016	30.1 mg/L		30 mg/L

2.5.4 Chlorides

There were 55 exceedances for the weekly average chloride limit from January 28, 2013 to September 8, 2017. Chlorides are being addressed through a revised source reduction measures plan outside the scope of this report. A revised SRM was submitted to WDNR on September 20, 2018. In addition, the Village of Yorkville has since received a written commitment from Racine County Public Works on the actions being implemented to reduce chloride discharges to the WWTP from their grounds/facilities located immediately north of the WWTP.

Table 6 – Chloride Exceedances

Date	Result Amount	Description	Limit Amount
01/28/2013	712 mg/L	Weekly Average Limit	710 mg/L
05/11/2013	465.3 mg/L		450 mg/L
09/15/2013	694.7 mg/L		450 mg/L
10/23/2013	454.5 mg/L		450 mg/L
11/22/2013	454.5 mg/L		450 mg/L
01/18/2014	1222.5 mg/L		710 mg/L
02/15/2014	1011.3 mg/L		710 mg/L
02/23/2014	1315 mg/L		710 mg/L
03/01/2014	995 mg/L		710 mg/L
04/12/2014	776.7 mg/L		710 mg/L
04/15/2014	772 mg/L		710 mg/L
05/03/2014	705.5 mg/L		450 mg/L
06/01/2014	570 mg/L		450 mg/L
07/04/2014	561.8 mg/L		450 mg/L
09/07/2014	473 mg/L		450 mg/L
10/18/2014	476.8 mg/L		450 mg/L
11/08/2014	588.8 mg/L		450 mg/L
12/01/2014	712 mg/L		710 mg/L
01/10/2015	1437.5 mg/ L		710 mg/L
03/08/2015	872.8 mg/L		710 mg/L
04/04/2015	885.8 mg/L		710 mg/L
05/16/2015	695.8 mg/L		450 mg/L
06/06/2015	550 mg/L		450 mg/L
06/08/2015	590 mg/L		450 mg/L
07/18/2015	560 mg/L		450 mg/L
08/08/2015	520.8 mg/L		450 mg/L
09/21/2015	534 mg/L		450 mg/L
09/22/2015	566 mg/L		450 mg/L
10/10/2015	555.3 mg/L		450 mg/L
11/01/2015	534.8 mg/L		450 mg/L
01/24/2016	809 mg/L		710 mg/L
02/13/2016	774 mg/L		710 mg/L
02/15/2016	799 mg/L		710 mg/L
03/14/2016	730 mg/L		710 mg/L
04/16/2016	734.3 mg/L		710 mg/L

Table 6 – Chloride Exceedances

Date	Result Amount	Description	Limit Amount
05/07/2016	673 mg/L		450 mg/L
05/08/2016	598.3 mg/L		450 mg/L
07/09/2016	552.8 mg/L		450 mg/L
08/20/2016	516.5 mg/L		450 mg/L
08/22/2016	540.5 mg/L		450 mg/L
09/06/2016	519.5 mg/L		450 mg/L
09/08/2016	500.5 mg/L		450 mg/L
10/01/2016	501.3 mg/L		450 mg/L
11/12/2016	533.3 mg/L		450 mg/L
11/15/2016	543 mg/L		450 mg/L
12/26/2016	791.7 mg/L		710 mg/L
01/14/2017	800 mg/L		710 mg/L
01/15/2017	785.7 mg/L		710 mg/L
05/13/2017	541.5 mg/L		450 mg/L
05/15/2017	533.5 mg/L		450 mg/L
06/11/2017	619 mg/L		450 mg/L
08/05/2017	537 mg/L		450 mg/L
08/08/2017	558 mg/L		450 mg/L
09/05/2017	456.3 mg/L		450 mg/L
09/08/2017	512 mg/L		450 mg/L

3 Design Criteria

3.1 Design Year

Based on a meeting with WDNR staff on August 22, 2018, the reissued WPDES permit was previously anticipated to contain a two (2) year compliance schedule to address current NOV's, from the effective date of the reissued permit. The preliminary permit reissuance schedule was for WDNR to reissue the permit effective April 30, 2019. However, the permit reissuance was delayed, and was issued with an effective date of October 1, 2019 with a final NOV compliance date of July 1, 2021.

To satisfy the Village's NOV compliance, this plan will focus on 20-year growth projections while also addressing existing deficiencies which led to the NOVs. A 20-year planning period is utilized for this facility plan as required by NR 110. The design year for the Yorkville WWTF is 2040. A short term planning period will also be evaluated for identifying more immediate upgrades required. The short term planning year for the Yorkville WWTF is 2030.

3.2 Previous NOV Related Discharge Permit Requirements

As defined by the previous WPDES Permit issuance, discharge limits presented in Table 7 were applicable during the previous permit term, which were the limits that lead to the NOV.

Table 7 – Current NOV Related Effluent Permit Limits

Parameter	Daily Maximum	Weekly Average	Monthly Average
BOD_5		30 mg/L	20 mg/L
TSS		30 mg/L	20 mg/L
Chloride (May-Nov)		450 mg/L	
Chloride (Dec-Apr)		710 mg/L	
Nitrogen, Ammonia (NH_3-N) (Nov-Apr)	11.4 mg/L	31 mg/L	12.4 mg/L
Nitrogen, Ammonia (NH_3-N) (May-Oct)	Monthly monitoring only from May through October		

3.3 Current Discharge Permit Requirements

Based on the reissued permit dated July 1, 2019, the effluent limits as shown in Table 8 currently apply. The current reissued permit is included as Appendix D. As shown, ammonia limits are more stringent in the reissued permit with new limits from May to October, as well as new daily maximum ammonia limits year-round based on effluent pH.

Table 8 – Current Effluent Limits

Parameter	Daily Maximum	Weekly Average	Monthly Average
BOD_5		30 mg/L	20 mg/L
TSS		30 mg/L	20 mg/L
Ammonia Nitrogen November – April May-October	 ***pH variable*** ***pH variable***	 ***29 mg/L*** ***5.1 mg/L***	 ***12.4 mg/L*** ***2.2 mg/L***
Total Phosphorus			***1.0 mg/L Until July 1, 2021, Then 0.8 mg/L for remainder of Permit, 0.075 mg/L following expiration of MDV***
Chloride	760 mg/L 950 lbs/day	400 mg/L 490lbs/day	400mg/L

3.4 Future Discharge Permit Requirements

As of the date of this draft facilities Plan, WDNR had not provided preliminary effluent limit calculations for the future flow projections. It is anticipated that effluent ammonia limits may be impacted by the increased flow proposed. Additionally, a future WQBEL of 0.075 or less for phosphorus will be included following expiration of the MDV. The effluent limit request documentation is found in Appendix H.

3.5 Projected Flows & Loadings

Using the amended Comprehensive Planning Area as a starting point for projecting future conditions, the following assumptions were made:

- Current total average daily flows of 70,000 gpd (0.070 MGD)
- Industrial and Mixed-Use Zoning Wastewater Flow Projections will use 535 gpd/acre to be consistent with currently calculated contributions from the existing sewer service area (Existing non-domestic average daily flow of approximately 60,000 gpd over 113 acres)
- No increase in residential area within the proposed SSA, however, existing residential acreage that is not currently served by sanitary sewer will be added to future flow projections. This accounts for an additional 129 people served and approximately 9,700 gpd at 75 gpcd.
- Secondary Environmental Corridors and Isolated Natural Resource Areas depicted in the 2035 Plan will be excluded from development within the recommended SSA.

The 20-year projected flows and loadings for Yorkville are found in Table 9.

Table 9 – 20-Year Flow and Loading Projections

		Projections					
Parameter	**Units**	**Existing**	**5-Year**	**10-Year**	**15-Year**	**20-Year**	**Peaking Factor**
Year		**2020**	**2025**	**2030**	**2035**	**2040**	
Population Served	people	177	209	242	274	309	
Population Equivalents	PE	**687**	**1,094**	**1,501**	**1,908**	**2,315**	
Flow							
Minimum Month (at startup)	MGD	0.047	0.075	0.102	0.130	0.158	0.67
Average Annual	MGD	0.070	0.111	0.153	0.194	0.236	N/A
Maximum Month	MGD	0.088	0.139	0.191	0.243	0.295	1.25
Maximum Week	MGD	0.113	0.179	0.246	0.313	0.380	1.61
Peak Day	MGD	0.165	0.263	0.361	0.459	0.557	2.36
Peak Hour	MGD	0.273	0.420	0.563	0.700	0.835	3.50
	gpm	190	292	391	486	580	
BOD_2							
Average Annual	mg/L	200	200				
	lb/d	117	186	255	324	393	

Table 9 – 20-Year Flow and Loading Projections

Parameter	Units	Projections					
		Existing	5-Year	10-Year	15-Year	20-Year	Peaking Factor
Maximum Month	lb/d	163	260	357	454	551	1.4
Maximum Week	lb/d	227	361	495	629	763	1.94
Peak Day	lb/d	350	558	765	973	1,180	3.0
TSS2							
Average Annual	mg/L	143	150				
	lb/d	83	139	191	243	295	
Maximum Month	lb/d	134	223	306	389	472	1.6
Maximum Week	lb/d	230	383	526	669	812	2.75
Peak Day	lb/d	417	697	957	1,216	1,476	5.0
TKN							
Average Annual	mg/L	30					
	lb/d	18	28	38	49	59	
Maximum Month	lb/d	26	41	56	72	87	1.47
Maximum Week	lb/d	44	70	96	122	148	2.5
Peak Day	lb/d	53	84	116	147	178	3.02
TP							
Average Annual	mg/L	5.5					
	lb/d	3	5	7	9	11	
Maximum Month	lb/d	5	8	10	13	16	1.47
Maximum Week	lb/d	8	13	18	22	27	2.5
Peak Day	lb/d	10	15	21	27	33	3.02

4 Identification of Alternatives

4.1 General

The identification of alternatives that follows makes the following assumptions based on previous activities:

- The previous recommendation of an SBR system as the most cost effective option made as part of the NOV Report and approved by WDNR still applies, and no analysis versus other WWTP upgrades is required as part of this facility plan.
- The two regional alternatives from the Final Compliance Alternatives Plan will be re-evaluated as part of this facility plan to determine cost effectiveness and feasibility. These alternatives include regionalizing with Racine and regionalizing with Union Grove.
- Fiscal impacts to the Village of Yorkville determined during the regional discussions revolving around the Foxconn development will be scaled based on the revised 20-year projections and included in the fiscal cost analysis.

4.2 Cost Effectiveness Analysis

A cost effectiveness analysis is performed to determine which wastewater treatment alternative will minimize total resource cost for the design life of the facilities and remain compatible with water quality goals. In a cost effectiveness analysis using the present worth analysis method, future costs are reduced to their present worth cost and summarized for each alternative. Future expenditures are converted to a present worth cost at the beginning of the planning period. The planning period is a time span for which alternative wastewater collection and treatment facilities are evaluated for cost effectiveness. Typically a 20-year planning period is selected which corresponds to the design life of much of the process equipment.

The total capital investment includes:

1. Initial capital construction costs plus engineering, legal, and administrative costs.
2. The capital costs necessary for major equipment replacement during the planning period. All future costs are discounted to the present using a single payment present worth factor computed at 3-3/8 percent; the present federally mandated discount rate. This yields the amount of money that must be theoretically invested at 3-3/8 percent when the project is initially constructed so that the capital required for equipment replacement would be available when such expenditures are required.

The salvage value at the end of the planning period, which represents a credit, must also be considered in the present worth costs. Structures and equipment with a service life extending beyond the 20-year planning period are considered to have a salvage value. Straight line depreciation methods are used to determine the salvage value for these components. The single payment present worth factor computed at 3-3/8 percent is also applied to the total salvage value. The resulting present worth is subtracted from the present worth cost for each alternative.

The values of operation and maintenance costs that occur during the planning period are discounted to a present worth. Only the operating costs that are impacted by the treatment alternatives such as chemical costs, aeration power costs, and solids handling and disposal are considered. All other operating costs are the same for all alternatives and are not included in the present worth analyses. The value of operation and maintenance costs that occur during the planning period is obtained by multiplying the estimated average operation and maintenance expenses during the 20 year planning period by a series present worth factor computed at 3-3/8 percent. This yields the amount of money that must be theoretically invested at 3-3/8 percent when the project is initially constructed so that the annual operation and maintenance expenses can be paid each year for the 20 year facilities design life.

Inflation of costs during the planning period was not considered in the analysis as specified in the Environmental Protection Agency (EPA) guidelines. Therefore, all costs quoted are based on June 2020 costs including future replacement costs and salvage values. The employed assumption is that all prices involved will tend to change by approximately the same percentage; thus, the results and conclusions drawing from the present worth cost analysis will not be affected by changes in the general level of prices.

4.2.1 Raw Wastewater Pumping

The existing raw wastewater pumps have adequate capacity for existing peak flows, however will exceed their rated capacity at the projected 20-year flows. Additionally, the pumping head required will change based on the recommended alternative for addressing current NOV's. The recommended alternative from the NOV report is carried forward and includes constructing a new concrete submersible raw wastewater lift station containing two pumps and discharging to the new treatment building. Additionally, for either regional alternative the flow and head conditions will change requiring a new raw wastewater pumping station at the Yorkville WWTP.

4.2.2 Influent Sampling and Flow Metering

Under all three alternatives developed as part of this facility plan, influent composite sampling and flow metering will be required. The existing facility does not have adequate provisions for influent flow metering. For Alternative 1, a new influent magnetic flow meter will be installed in the new treatment building and a new influent composite sampler will be installed in an adjacent room to keep if out of the hazardous classified rated space.

4.2.3 Fine Screening

The existing fine screen does not have age, condition or capacity related deficiencies. The fine screen can continue to be utilized under the recommended alternative to address NOV related deficiencies. Under alternative 1, the fine screen will be relocated to the new treatment building to remove it from the outside elements. A new bypass channel will also be constructed with a manual bar screen. It is anticipated the fine screen will reach the end of its useful life during the planning period, so Alternative 1 will include in-kind replace at Year-10 of the planning period.

4.2.4 Grit Removal

Yorkville's WWTP is not currently equipped with grit removal facilities. For Alternative 1, new grit removal facilities are recommended. A new stacked tray vortex grit removal system that includes a grit classifier and grit dewatering is included in the cost estimate for this alternative. Alternatives 2 and 3 do not require grit removal.

4.2.5 Secondary Treatment

The aeration basin in the existing package plant has several deficiencies as noted in Section 3 of this report. As such, improvements to the existing secondary treatment process currently utilized are critical to compliance with the current NOV's, anticipated growth, and future permit limits. The NOV Report identified feasible improvements to the existing package plant as well as technologies to replace the existing package plant and concluded that a new sequencing batch reactor (SBR) system.

4.2.5.1 Replacement Technologies

The approved NOV Compliance Report reviewed several technologies that provide increased removal performance over the existing package plant, require minimal footprint, and allow for flow and loading increases in the short-term. Three replacement technologies were evaluated to replace the existing package plant as noted below:

1. Replace Package Plant with a membrane bioreactor (MBR).
2. Replace Package Plant with a sequencing batch reactor (SBR).
3. Replace Package Plant with and aerobic granular sludge technology (AquaNereda®).

Of the three technologies reviewed, the most cost effective was construction of an SBR system for compliance with the NOV, future growth, and compatibility with future phosphorus limits. This alternative will be carried forward in the facility plan to be compared against two regionalization alternatives.

4.2.6 Phosphorus Removal

The Yorkville WWTP has been feeding a rare earth chloride during the current permit term to satisfy interim phosphorus limits and minimize its payments to the County as part of the multi-discharger variance (MDV) for phosphorus. It is anticipated the use of rare earth chloride for phosphorus removal will continue under alternatives that retain treatment at the Yorkville WWTP.

Additionally, it is likely the MDV will expire during the 20-year planning period. While DNR has the ability to re-apply to the USEPA for continuance of the MDV, this facility plan takes a conservative approach and assumes that WQBEL's for phosphorus will become effective at approximately the mid-point (Year 10) of the planning period. While the final tertiary treatment technology has not been reviewed in detail as part of this facility plan, it is currently assumed that a new disc filter system housed in a new tertiary treatment building is the basis for future upgrades.

4.3 Alternative 1 – Sequencing Batch Reactor & Associated WWTP Improvements

Alternative 1 considers replacement of the existing package plant with a new sequencing batch reactor (SBR) constructed north of the existing package plant. Specifically, this alternative considers the following elements:

- Construction of a new submersible raw wastewater lift station
- Decommission of the existing packaged steel raw wastewater lift station
- Construction of a new treatment building housing the following:
  - Relocated fine screen and screen bypass channel
  - New stacked tray vortex grit removal and bypass channel
  - Grit concentrator and & dewatering
  - Influent flow metering and sampling equipment
  - Electrical Room
  - Chemical Feed and Storage Room
  - Administration & Laboratory Room
  - Mechanical Equipment Room
  - Bathroom
- Construction of a two basin SBR system each 39 ft x 39 ft x 23 ft deep
- One post SBR equalization tank sized to reduce design peak hour flows to the capacity of the existing WWTP outfall pipe
- Construction of a piping, valve and metering vault located between the SBR Tanks and Equalization tank to house control valves, WAS and final effluent flow metering and associated interconnecting piping
- One floating mixer installed in each SBR basin
- One floating decanter installed in each SBR basin

- One submersible WAS pump installed in each SBR basin
- Associated instrumentation, controls and electrical
- Removable fine bubble diffusers installed in each basin
- Conversion of the existing aeration tank into aerated WAS storage, and replacement of the existing platform mounted aerators

The SBR would also be designed for 20-year projections, and operated to biologically remove TP and TN. Additional chemical feed for polishing will be included to satisfy interim limits of the MDV. This alternative would also address the NOV's for BOD, TSS, and ammonia.

4.4 Alternative 2 – Regionalization with Racine

4.4.1 Introduction

Regionalization alternatives would allow Yorkville to avoid addressing both the NOV related deficiencies, future growth, and future more stringent phosphorus limits (following expiration of the MDV) by discharging wastewater directly to another municipality's collection system for treatment. Under regionalization alternatives Yorkville would become a customer of another municipality. Two regionalization alternatives were investigated as part of this facilities plan:

1. Regionalization with Racine.
2. Regionalization with Union Grove.

4.4.2 Description

The discussion of a regional alternative with Racine has been investigated on a number of occasions over the last 15 years, most recently following the Foxconn announcement. The Racine regionalization alternative is complex in nature due to a number of items, including:

- The existing Racine Intergovernmental Sanitary Sewer Service, Revenue Sharing, Cooperation and Settlement Agreement, of which Yorkville is not currently a part of.
- Significant changes to sewer system infrastructure as a result of the Foxconn development in Mount Pleasant, of which the Village of Yorkville participated in technical, financial, and political discussions regarding the Village's future involvement.

Based on the above two items, a number of initial capital, future capital, ongoing O&M and fiscal cost impacts would be applied to the Village of Yorkville, should the Village pursue the Racine regionalization alternative.

In 2015, the Village hired AECOM to conduct a preliminary review of the Racine Intergovernmental Agreement to identify costs that would be allocated to the Village as a result of becoming party to the agreement. The summary memo prepared by AECOM is incorporated by reference as Appendix I to this report. The following costs were identified as part of AECOM's analysis:

- The Village would need to become party to the Racine Area Intergovernmental Sanitary Sewer Service, Revenue Sharing, Cooperation and Settlement Agreement as part of this alternative and pay the following based on details contained in the agreement:
  - Regionalization User Charges – (Fiscal Cost) – Approximately $131,400 annually.
  - Shared Conveyance O&M Costs – (Fiscal Cost) – Approximately 1,314,000 based on 2015 AECOM memo

– Future Shared Conveyance System Upgrade Costs - (Cost Effectiveness – 20-Year Present Worth) – Determined below
– Racine Cost Allocation Debt Service – (Fiscal Cost) – Approximately $196,100 annually
– Revenue Sharing – (Fiscal Cost) – Approximately $56,500 based on 2015 AECOM memo
– Connection Fee Debt Service – (Fiscal Cost) – Approximately $16,800 annually based on 2015 AECOM memo

During the 2017/2018 Foxconn negotiations, additional cost elements and stipulations were identified that the Village would be responsible for, including the following:

- The City of Racine noted at the time of the Foxconn discussions that they would only accept the Yorkville Sewer Utility, if the Yorkville Water Utility also joined the Intergovernmental Retail Water Service Agreement between the City of Racine and the Village of Mount Pleasant
- The Village would also need to become party to a Lake Michigan diversion request as being a party to the Racine/Mt. Pleasant Retail Water Agreement
- The Racine Water and Wastewater Utility also noted that a capacity allocation would need to be leased (likely from the City itself) on a short term basis at the cost of $2 million per MGD at a 5% interest rate, and that a long term capacity purchase would be required following the 5-year lease at a cost of $10 million per MGD of capacity.
- Supplemental revenue sharing would be required in addition to revenue sharing identified in the Intergovernmental agreement.

Should the cost effectiveness analysis determine that the alternatives are within 10% of each other on present worth, the above fiscal cost items will be used to make a justification for the recommended alternative.

4.4.3 Alternative Development

The Racine Regionalization Alternative requires the following initial or future capital improvements during the planning period:

Village of Yorkville Improvements:

- Decommissioning of existing WWTP
- Construction of a new lift station at the WWTP site
- Construction of odor control feed and storage (Bioxide)
- Construction of flow metering and sampling facilities. Additional capital costs are assumed in year 10 to replace the sampling and metering equipment.
- Construction of a new 6" force main approximately 18,200 feet long from the existing Yorkville WWTP site to the connection point in Mt. Pleasant at Braun Rd. (See Figure 1) It is assumed that the force main will follow existing road right of way in the Village of Yorkville, crosses STH 11, continuing south along the west frontage road to I-94, crossing under at Braun Road. Approximately 200 feet is assumed to require casing pipe, and another 250 feet is assumed to require construction in existing roadway versus outside of paved areas, which increases the cost per foot. See Figure 1 for a map depicting the conceptual force main alignment.

Village of Mount Pleasant Improvements (Yorkville Share):

- Construction of a Yorkville gravity interceptor connection from the termination of the force main at I-94 to the Mount Pleasant interceptor at WisConn Valley Way (assumed 1,320 feet long) at $175 per lineal foot, for an initial cost of $231,000.
- Construction of a relief sewer to expand capacity of the interceptor sewer along CTH KR and CTH H. Based on correspondence with DNR, the current interceptor would be at capacity without construction of a relief sewer. The relief sewer is estimated at 8,700 ft long at $175 per lineal foot, for an initial cost of $1,519,000.
- A portion of the lift station and force main in Mount Pleasant has already been constructed, however it is anticipated that the second planned force main and additional pumps will be required in the future to convey flows from the Village of Yorkville. Based on discussion with DNR, this plan assumes that 1/3 of the total cost of the lift station and future force main are future costs. It is assumed that these costs would occur in Year 5 of the planning period, and the Village's share of the cost is approximately $484,000.

Racine WWTP Improvements (Yorkville Share):

- As noted in the discussion above, the Racine Water and Wastewater Utility provided a cost per MG of future upgrade capacity during Foxconn negotiations. This cost amounted to $10M per MG of capacity required. For an assumed future purchase capacity of 0.26 MGD at average annual design flows, this amounts to a future cost in Year 5 of the planning period of $2.6 M with a present worth value of $1,866,000.

4.4.4 Feasibility

Regionalization with Racine is a feasible alternative with respect to constructability. However, this alternative comes with added complexity, as Yorkville would need to become part of the Racine Intergovernmental Sewer Agreement, which includes several stipulations that would have significant impacts on the sewer rate payers within the Village of Yorkville. These costs are further evaluated in the fiscal cost analysis, and used to support a final recommendation for the most cost effective alternative for the Village of Yorkville.

4.4.5 Cost Analysis

A cost estimate was prepared for regionalization with Racine that included the elements identified above. The estimated initial capital cost of regionalization with Racine is $10,545,000.

The present worth value of future costs identified in Year 5 is $2,235,000.

Annual O, M & R costs for this alternative are estimated at $70,490/year, for at present worth value of $1,013,000.

Salvage value at the end of the planning period for items with greater than a 20 year design life was estimated and is approximately $1,004,000.

The net present worth of this compliance option is $12,789,000. See Appendix J for the estimate and present worth calculations.

4.5 Alternative 3 – Regionalization with Union Grove

4.5.1 Introduction

The Village of Union Grove is now completely surrounded by the new Village of Yorkville, being located in the southwestern corner of the Village. Union Grove holds a WPDES Permit for its WWTF, which has a design capacity of 2.0 MGD. The Village of Union Grove has completed its phosphorus planning and has also applied for the multi-discharger variance (MDV) for interim phosphorus compliance. It was noted in the compliance alternatives plan that the Village would require an approximately $5.8 million improvement using cloth media disc filters to comply with future limits. Should the Village of Yorkville regionalize with Union Grove, it is likely an expansion to the facility to accept Yorkville's flows and loadings and comply with future phosphorus limits would also be required.

4.5.2 Description

This alternative was developed using the following assumptions:

- A new main lift station at the Yorkville WWTF
- Decommissioning of the existing WWTF
- A new 6" force main approximately 8,250 feet long
- Approximately 20,000 feet of gravity interceptor sewer and associated manholes from the force main discharge to the connection point in the Union Grove collection system
- Two water crossings
- Two additional lift stations
- Sampling and Metering Equipment

4.5.3 Feasibility

Regionalization with Union Grove could potential be a feasible alternative if drivers such as economic development are a priority. However, this alternative would require a much more costly force main than regionalization with Racine. In addition, Union Grove's facility would require upgrades to accept the Yorkville flows and loadings, as well as future upgrades for WQBEL's for phosphorus as Union Grove has also applied for the MDV, similar to Yorkville. For these reasons, this alternative is being removed from further consideration.

4.5.4 Cost Analysis

A detailed cost analysis was not completed for this alternative as it has been ruled out based on the feasibility discussion above.

4.6 Comparative Analysis of Alternatives

NR 110.09(3)(c) requires a facility plan to have a comparative analysis of feasible alternatives based on four criteria: "capital and operating costs; significant primary and secondary environmental effects; physical, legal or institutional constraints; and whether or not they meet regulatory requirements." This section will review each of these criteria.

4.6.1 Capital and Operating Costs

4.6.1.1 Capital Costs

A detailed cost estimate for Alternative 1 is provided in Appendix J. The estimated capital present worth cost for this alternative is $5,616,000, including engineering and contingencies.

A detailed cost estimate for Alternative 2 is provided in Appendix J. The estimated capital present worth cost for this alternative is $10,545,000, including engineering and contingencies.

4.6.1.2 Operation & Maintenance Costs

Operation, maintenance and replacement costs (O, M and R) for a new SBR mechanical plant are estimated at an additional $86,817/year.

Operation, maintenance and replacement costs (O, M and R) for Alternative 2 are approximately a reduction of $70,490/year.

4.6.1.3 Total Present Worth Cost

Total present worth costs for Alternatives 1 and 2 are presented in Table 10. As shown, Alternative 1 is the most cost effective alternative on a total present worth basis, approximately 10% lower than Alternative 2.

Table 10 – Present Worth Cost Analysis

Alternative	Initial Capital Cost	Present Worth of Annual Cost	PW of Future Costs	PW of 20-Year Salvage Value	20-Year Net Present Worth Cost
Alternative No. 1	$5,616,000	$1,248,000	$900,000	($696,000)	$7,068,000
Alternative No. 2	$10,545,000	$1,897,000	$2,786,000	($1,124,000)	$14,104,000
Alternative No. 3	$18,323,000	$763,000	$22,000	($1,467,000)	$17,641,000

4.6.2 Significant Primary and Secondary Environmental Effects

4.6.2.1 Primary Environmental Impacts

Both alternatives 1 and 2 will be able to achieve the goals for addressing the current NOV's and providing adequate wastewater treatment for growth once the new facilities are completed. All will produce a positive impact upon the receiving stream. The effluent quality produced by Alternative 1 will be the highest, as this alternative includes membrane filtration.

4.6.2.2 Reliability of Treatment

Alternative 1 will provide reliable treatment over the range of flows and loadings identified, as it is sized based on NR110 requirements. For alternatives 2, wastewater generated within Yorkville, and treated in Racine will depend on the performance of those respective facilities.

4.6.2.3 Secondary Environmental Impacts

Alternative 1 has all construction occurring on the current property on land that has been previously disturbed. Environmental impact is expected to be minimal with no disruption of wooded areas, wetlands, meadows or other critical environments. For alternative 2, significant construction would occur outside of the existing facility, most likely along existing road right of way. Temporary environmental impacts would occur during construction along the respective force main alignments.

4.6.3 Physical, Legal and Institutional Constraints

4.6.3.1 Utilization of Village Staff

Alternative 1 replaces the existing package plant operations with processes that are not familiar to the Village’s current operations staff. Operations staff would require additional training to operate the new technologies employed. All three of the alternatives developed would have a higher degree of automation than currently employed, which would reduce the amount of operations attention required.

4.6.3.2 Available Land for Future Expansion

One limitation of the existing WWTP site is the availability of land for future construction. It is likely that upon completion of Alternative 1 presented above, minimal additional land would be available for future expansion on the existing site.

However, the current comprehensive planning process has determined that the Village desires to limit future growth, and it is not anticipated that future capacity upgrades would be required.

4.6.3.3 Length of Construction Period

The length of construction period for Alternatives 1 and 2 would each be in the range of 1 to 1 1/2 years. Each of the three alternatives was developed to allow construction to proceed with minimal impact to the operations of the existing package plant. Short duration cutovers would be required for each alternative.

5 Public Participation

5.1 Public Hearing

Municipalities are required to conduct a public hearing in accordance with NR 110.09(4) for any new or significantly modified sewerage system. The WDNR allows exceptions to this requirement if the proposal is for a minor upgrade, or if it is a revision to a previously approved project subject to a previous public hearing. A public hearing is anticipated as part of this facility planning effort and will be scheduled following cursory review of the facility plan by WDNR. Appendix K is reserved for Public Hearing meeting minutes and public comments received.

6 Interagency & Intra-Agency Comments

6.1 Conformance with Regional Plans

Correspondence with the Southeastern Wisconsin Regional Planning Commission (SEWRPC) is found in Appendix F. A letter was sent to SEWRPC on January 22, 2020 requesting confirmation that population projections and influent flows outlined in Chapter 3 correspond to the current regional plan. SEWRPC replied on January 26, 2009 confirming that the population projections correspond to DOA projections and are suitable for use in the facility plan.

6.2 Compliance with other Federal, State, and Local Regulations

The proposed alternatives for the Yorkville WWTF upgrades will satisfy requirements set forth in NR110 for design of wastewater facilities operating under WPDES permits in addition to applicable USEPA codes for wastewater treatment enforced by the WDNR.

7 Selection and Implementation of Cost Effective Alternative

7.1 Preliminary User Rate Analysis

Table 11 presents a preliminary user rate analysis for Alternative 1. As shown, user rates are anticipated to increase, and a public hearing will be required based on NR110 as rates are anticipated to increase by more than 10%.

Table 11 – Preliminary User Rate Analysis

Description	2020 Existing	Alternative 1 – Upgrade Yorkville WWTP
Operation & Maintenance	$209,636	$292,919
Administration	$92,065	$92,065
Capital Expenditures	$30,500	$30,500
Planning	$30,000	$30,000
Existing Debt Service	$0	$0
Equipment Replacement Fund	$3,534	$49,158
New Debt Service		$331,965
MDV Payments to County		$12,618
Total Revenue Required	**$365,735**	**$839,225**
Misc. (Includes Interest)	$944	$0
Connection Fees	$0	$0
TID Impact		$157,319
Commercial Revenue	$321,891	$600,160
Residential Revenue	$42,900	$81,746
Average Quarterly Residential Rate	$151.05	$287.84
Average Annual Residential Rate	$604.22	$1,151.36
Residential Sewer Charge % of MHI	0.79%	1.51%

7.2 Recommended Plan

Given a combination of the present worth cost analysis, fiscal impacts to the rate payers of the Village of Yorkville, and the current deficiencies at Yorkville's WWTP with respect to current NOV, and more stringent effluent limits in the forthcoming permit reissuance, SEH recommends Yorkville proceed with Alternative 1, to address NOVs, future limits and 20-year growth. This alternative is the lowest initial capital cost and has the advantage of not relying on much of the existing aged infrastructure for much of the future treatment, and would provide the Village with flexibility as growth occurs. Additional SBR tanks could be constructed in the future if needed. This alternative includes:

Recommended plan to address NOV, 20-year projections and prepare for future phosphorus limits:

- Construct a new submersible raw wastewater lift station
- Construct a new Treatment Building housing the following:
  - Relocated fine screen and screen bypass channel
  - New stacked tray vortex grit removal and bypass channel
  - Grit concentrator and & dewatering
  - Influent flow metering and sampling equipment
  - Electrical Room
  - Chemical Feed and Storage Room
  - Administration & Laboratory Room
  - Mechanical Equipment Room
  - Bathroom
- Construct a new two basin SBR system.
- Construct a post SBR Equalization tank to reduce peak flows below existing outfall capacity and reduce the size requirements of future tertiary filtration equipment
- Construct exterior Pad Mounted SBR Blowers
- Construct interconnecting piping between the existing aeration basin and new system for digestion and sludge storage of WAS from the SBR.
- Convert the existing aeration tank to aerated WAS Storage.
- Decommission the existing final clarifier and sludge storage tank
- Associated site civil and electrical improvements

A conceptual site layout for the recommended alternative is presented in Appendix L.

A preliminary design basis memorandum for the recommended alternative is presented in Appendix M.

7.3 Construction Phasing

Given the extremely tight compliance schedule for the NOV, it is recommended the Village immediately proceed with the project as a single phase construction.

7.4 Implementation

7.4.1 Institutional Responsibility

The Village of Yorkville's financial, legal, and institutional authority for implementing the proposed project is vested in the Wisconsin Statutes. To meet the water pollution control requirements of the WDNR and the EPA, the Village must construct the proposed wastewater treatment upgrades to address the previous NOV's, long-term projected growth, and prepare for future WQBELs for phosphorus following expiration of the MDV in a future permit term.

7.4.2 Implementation Schedule

The anticipated schedule for implementing the project is outlined below:

Submit NOV Report to DNR	October 2018
DNR Reissues WPDES Permit	October 2019
Submit Facilities Plan Amendment to the DNR	June 2020
Coordinate 1st Edition SSA with SEWRPC	July 2020
Conduct Public Hearings for SSA	July 2020
Conduct Public Hearing for Facilities Plan	August 2020
DNR Approval of Plan	September 2020
Submit Plans and Specifications to the DNR	September 2020
DNR Approval of Plans and Specifications	November 2020
Construction Contract Bidding	January 2021
Award of Contract	February 2021
Start Construction	March 2021
End Construction/Startup/Achieve Compliance with NOV	June 2022

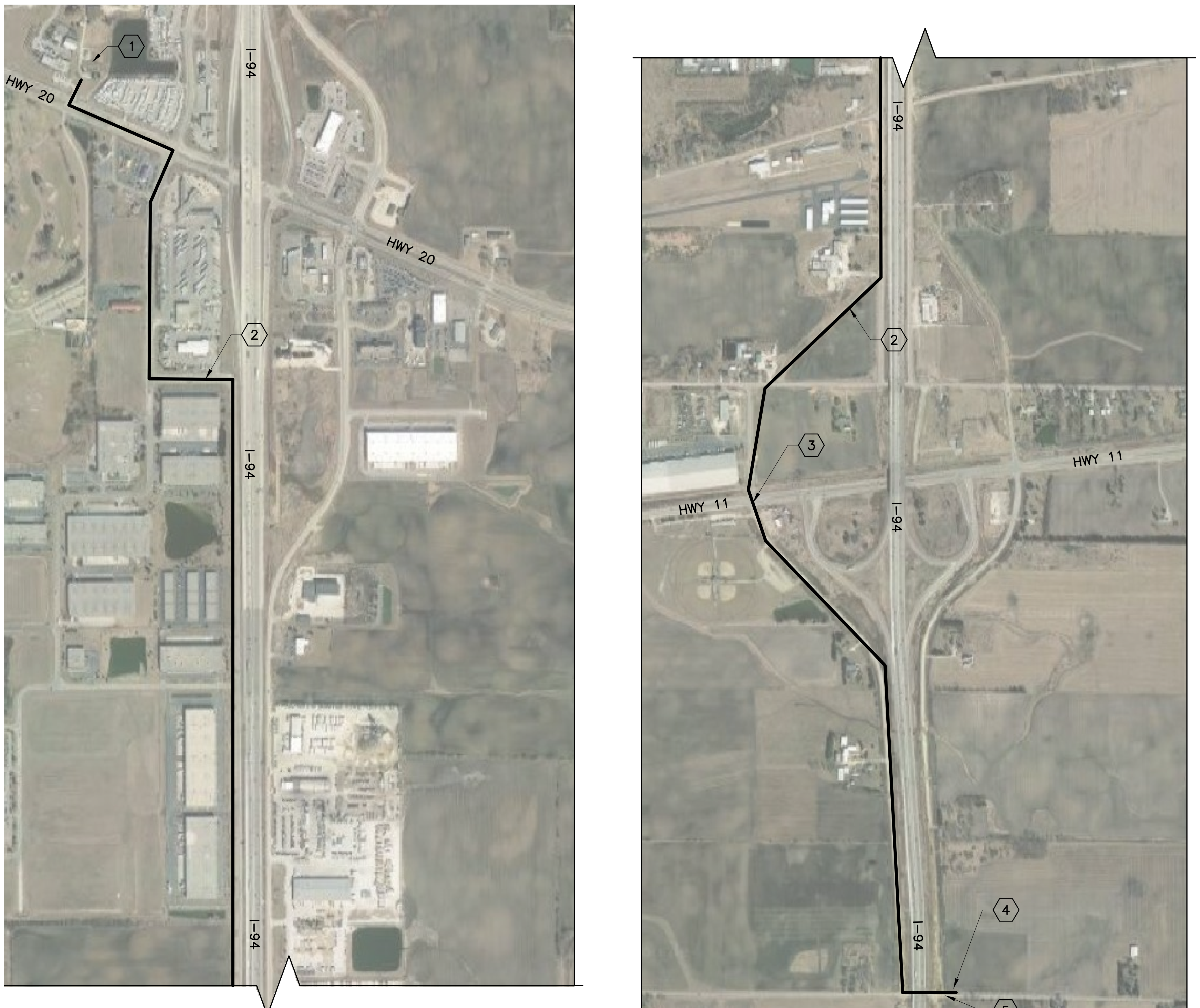
7.4.3 Funding Method

The Village plans to finance the project using the State of Wisconsin Clean Water Fund Program (CWFP). The CWFP finances wastewater treatment facility projects with a State Revolving Fund (SRF) loan program. EPA provides grants to the states to create a SRF program to provide loans for wastewater treatment facility construction. In 1990, the State of Wisconsin created the Clean Water Fund program.

At the present time, the legislation says that "compliance maintenance" and "changed limits" projects receive an interest rate which equals 55 percent of the State's market rate. With the market rate being 3 percent, the 45 percent reduction is a significant financial advantage. The current clean water fund program interest rate is 1.6%.

Figures

Figure 1 – Alternative 2 Yorkville Force Main Alignment



KEYNOTES

1. YORKVILLE WWTP & RWW LIFT STATION
2. 6" DIA FM CONSTRUCTED IN EXISTING ROAD ROW
3. CASING PIPE REQUIRED AT HWY 11 CROSSING
4. INSTALL SAMPLING MH AT CONNECTION POINT
5. FM DISCHARGE CONNECTION POINT MH EAST OF I-94 ON BRAUN ROAD

LEGEND

FORCE MAIN LINE
18200 FT TOTAL LENGTH

N

Conceptual Force Main Alignment

0 100 200

SEH

YORKVILLE, WISCONSIN

Figure 1 – Conceptual Force Main Alignment to Mount Pleasant for Alternative 2

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FIGURE NO. 1

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Appendix A

NOV Report

Appendix A - NOV Report

2018 WWTP NOV Response Plan

Yorkville Utility District No. 1

Village of Yorkville, WI

146260 | October 1, 2018

SEH

Building a Better World for All of Us®

Engineers | Architects | Planners | Scientists

2018 WWTP NOV Response Plan

Village of Yorkville, WI

Prepared for:
Village of Yorkville Sanitary Utility District No. 1
Yorkville, WI

Prepared by:
Short Elliott Hendrickson Inc.
809 N. 8th Street, Suite 205
Sheboygan, WI 53081-4032
920.452.6603

I, Dan Schaefer, PE, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Dan Schaefer

Dan Schaefer, PE, PE Senior Professional Engineer	40481-6 PE Number	October 1, 2018 Date

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2018 WWTP NOV Response Plan

Village of Yorkville Utility District No. 1

Prepared for Village of Yorkville Sanitary Utility District No. 1

1 Background Information

1.1 Need for Proposed Project

The Village of Yorkville (Yorkville) is investigating short-term wastewater treatment alternatives in response to two events:

1. Notices of Violation (NOV's) received for BOD, TSS, Ammonia, and chlorides
2. Anticipated growth as a result of the nearby FoxConn development.

Yorkville has committed to drafting a plan for addressing NOV's to comply with current and anticipated future Wisconsin Pollutant Elimination System (WPDES) Permit limits.

The current WWTP is currently 36 years old and not consistently achieving removal efficiencies needed to meet current and future WPDES requirements. Yorkville also anticipates increases to flows and loadings as a result of ancillary development from the new FoxConn development located in Mt. Pleasant on the East side of I-94. FoxConn is planning on hiring approximately 3,000 employees initially with potential to grow up to 13,000. The expected ancillary growth would exceed the current WWTP capacity.

1.2 Abbreviations

The following list of abbreviations may be used in this report:

ADF	-	Average Daily Flow
BOD	-	biochemical oxygen demand
BPR	-	Biological Phosphorus Removal
cfm	-	cubic feet per minute
cu ft	-	cubic feet
DOA	-	Department of Administration
ft	-	feet
gpd	-	gallons per day
gph	-	gallons per hour
gpm	-	gallons per minute
gpcd	-	gallons per capita per day
MBR	-	membrane bioreactor
MGD	-	million gallons per day
mg/L	-	milligrams per liter
NH3-N	-	ammonia nitrogen
NOV	-	Notice of Violation
O&M	-	Operation & Maintenance

P	-	phosphorus
PE	-	population equivalents
ppd	-	pounds per day
RAS	-	return activated sludge
SBR	-	sequencing batch reactor
SEWRPC	-	Southeastern Wisconsin Regional Planning Agency
sq ft	-	square feet
SSA	-	sewer service area
SWD	-	side water depth
TDH	-	total dynamic head
TKN	-	total Kjeldahl nitrogen
TP	-	total phosphorus
TSS	-	total suspended solids
UV	-	ultraviolet
VSS	-	volatile suspended solids
WAS	-	waste activated sludge
WDNR (DNR)	-	Wisconsin Department of Natural Resources
WWTP	-	wastewater treatment facility
WPDES	-	Wisconsin Pollutant Discharge Elimination System
WW	-	wastewater

1.3 Planning Area

In order to both address the NOV's and prepare Yorkville for short-term growth, a 5-year planning area has been identified that will be used as a basis for sizing unit process treatment alternatives in this plan. The current area served by the WWTP will be extended to further south to account for approximately 200 additional acres south of the existing Grandview Industrial Park. Figure 1 presents a map indicating the additional limited 5-Year planning area.

2 Existing Conditions

2.1 Description of Existing Wastewater Treatment Facilities

The existing facility was constructed in 1982, the facility consisted of the following:

1. Lift Station
2. Comminutor
3. Aeration Basin with Mechanical Aerators
4. Final Clarification
5. Aerobic Digester
6. Laboratory and Maintenance Building

The treatment plant was designed for extended aeration activated sludge with the following design rating:

Average Daily Flow	=	150,000 gpd
Average BOD Loading	=	255 ppd
Average TSS Loading	=	278 ppd

2.2 Unit Process Age, Condition & Capacity Deficiencies

The following sections describe the age, condition and capacity related deficiencies of the current WWTP, with a specific focus on deficiencies that impact NOV's observed.

2.2.1 Preliminary Treatment

Both the influent lift station and comminutor have been replaced since the original construction in 1972. Further detail on each project is provided below. There are currently no age, condition, or capacity related issues with either the influent lift station or influent fine screen unit processes.

Influent Lift Station – Rebuilt in 2018, new controls in 2004

Influent Lift Station upgrades included a complete rehabilitation of the existing lift station including pumps, valves and controls.

Influent Fine Screen Installation – Approximately 2011

The comminutor was replaced with an inclined fine screen equipped with an integral screening washer/compactor. The new fine screen is located outside adjacent (west) to the aeration tank. Both the influent pump station have remaining useful life and are in good operating condition. Though, the lift station pumps will need to be replaced to meet the substantial growth that is expected. Each also has adequate capacity to screen and convey current peak flows.

2.2.2 Secondary Treatment

The aeration tank operates in conjunction with the final clarifier to provide secondary treatment. Effluent from the fine screen flows to the aeration tank by gravity. Vertical shaft mechanical aerators with dual impellers mix and aerate the wastewater to provide oxygen for BOD and ammonia removal. These aerators are two-speed with configurations for both summer and winter aeration. Aeration is controlled by a DO probe. The west aerator is typically in the lead position and operates based on DO demand. The center aerator runs at constant low speed and the East aerator is also controlled by the DO probe and is in the lag position.

With only one aeration tank, WWTP operations staff has never been able to take the tank out of service to inspect both the tank structure and the mechanical condition of the aerator shafts and impellers. Only preventative maintenance has been performed on the aerators to date. The mechanical aerators are operating well beyond their original useful design life.

In the aeration tank, raw wastewater is mixed with active aerobic microorganisms (activated sludge) in an aerobic environment. Air is introduced into wastewater by the mechanical aerators maintaining an aerobic environment in the aeration tank to satisfy the biochemical oxygen demand. The aeration system is controlled by a DO probe to maintain a minimum DO of 2.5 mg/L. The activated sludge is settled in the final clarifier and returned to the aeration tank as return activated sludge (RAS) or wasted to the aerator digester as waste activated sludge (WAS).

The primary function of the aeration tank is BOD reduction to provide acceptable effluent. The long detention time of extended aeration will, after initial BOD reduction, also convert ammonia nitrogen to nitrate nitrogen (nitrification) and accomplish considerable aerobic digestion (volatile solids reduction). Recently the tanks ability to nitrify in winter months has been inconsistent leading to several exceedances for ammonia.

Solids settled in the clarifier are continuously removed by gravity and returned to the aeration tank through lower ports in the common wall of the aeration tank and clarifier. No control over RAS rates is afforded the operator leading to periodic clarifier upsets, and difficulty preventing nitrifier washout during peak events.

Final effluent flows over the weir in the final clarifier and through the old chlorine contact tank, and over the outfall weir. No disinfection is required at the WWTP.

The clarifier has undergone multiple complete rebuilds with the most recent occurring in 2014. As of 2016 Yorkville began monthly servicing on the clarifier in addition to regular maintenance. The additional maintenance service is to help with the BOD exceedances and has a cost of $3,000 per month.

Current clarifier limitations will make compliance with the Village's current NOV's more difficult. There were various exceedances of BOD in the winter months and multiple exceedances of ammonia and TSS. The final clarifier shares a common wall with the aeration tank which does not allow for proper control of the sludge blanket by adjusting RAS rates, as RAS only flows by gravity. The lack of sludge blanket control has also lead to problems with the facility's TSS.

Based on the deficiencies of the activated sludge system indicated above, it is recommended that any future treatment improvements to address the NOV also included upgrade and replacement of all or portions of the existing package plant. Some of the package plant structure may be reused for other purposes.

2.2.3 Disinfection

Disinfection is not required at the Yorkville WWTP based on the classification of the receiving water.

2.2.4 Solids Handling

WAS is removed from the final clarifier and aeration tank to the aerobic digester by gravity. Aerobically digested sludge is stored in the aerobic digester until a contract hauler removes the sludge for storage and/or land application. The aerobic digester is equipped with provisions for decanting to reduce the water volume hauled during contract hauling.

Prior to implementation of Sorb-X for phosphorus removal at the WWTP, the existing aerobic digester provided limited potential for decanting to reduce total sludge volumes requiring disposal.

2.2.5 Laboratory & Maintenance Building

The laboratory & maintenance building houses the laboratory, MCC's, and other maintenance supplies for the WWTP. The backup generator is installed outside adjacent to the laboratory and maintenance building. The current electrical room does not have any additional capacity for new electrical equipment or control panels; thus a new electrical room would be needed for any additional unit treatment processes if the facility were to upgrade.

2.2.6 Summary of Unit Process Deficiencies

There are numerous deficiencies at the WWTP which combined to lead to many of the NOV's experienced. Many of the deficiencies are due to the original design of the facility. The deficiencies include:

- Original design capacity was based on organic (BOD) removal only (no nitrification)
- Lack of ability to control WAS rate & SRT
- No RAS pumping, lack of sludge blanket control
- Poor Tank Geometry (aeration tank & clarifier)
- Inconsistent winter nitrification due to the above bullets
- Limited aeration control
- Lack of redundancy
- Lack of MCC space for new motor starters
- Site space limitations
- Age of Infrastructure

Alternatives developed in Section 4 of this report will be developed to address many of the above deficiencies to eliminate future NOV's.

2.3 Existing Facility Effluent Quality & NOV's

The following sections provide effluent summaries for BOD, ammonia, TSS and chlorides. Also included are discussions of NOV's received for each constituent. NOV correspondence is included in Appendix A.

2.3.1 BOD

There were 8 exceedances between January 2016 and July 2017, primarily in winter conditions. Effluent BOD averaged 6.95mg/L with a range from 0.01 to 95 mg/L in 2015. Effluent BOD averaged 17.61mg/L with a range from 2 to 200 in 2016. Yorkville's current WPDES allows for a weekly BOD average of 30mg/L and a monthly average of 20mg/L. Table 1 presents a list of all NOV's for BOD. The facility has been spending $3,000 per month on additional maintenance to aid in BOD reduction.

Table 1 –
BOD Exceedances

Date	Result Amount	Description	Limit Amount
01/03/2016	67.1 mg/L	Monthly Avg.	20 mg/L
01/03/2016	51 mg/L	Weekly Average Limit	30 mg/L
01/11/2016	39 mg/L		30 mg/L
01/17/206	30 mg/L		30 mg/L
01/25/2016	115.3 mg/L		30 mg/L
04/04/2016	22.1 mg/L	Monthly Average	20mg/L
05/01/2016	31.5 mg/L	Weekly Average Limit	30 mg/L
07/24/2017	93.7 mg/L		30 mg/L

2.3.2 Ammonia

There were 22 ammonia exceedances from February 2014 to January 2017. Ammonia exceedances are listed in Table 2. The WWTP was originally designed for BOD removal only, as the original facility was intended to be an interim facility. Subsequently, ammonia limits were added to the permit, and the WWTP has problems with nitrifying in winter conditions even though the facility operates at approximately 50 percent of the original design flow capacity. Year-round nitrification is also inhibited by the lack of RAS pumping and control of WAS flow rates. To combat ammonia problems with cold temperatures operations staff at the facility have attempted to increase mixed liquor concentrations in the fall.

Table 2 – Ammonia Exceedances

Date	Result Amount	Description	Limit Amount
02/17/2014	11.8	Daily Maximum Limit	11.4 mg/L
01/10/2015	17.5		11.4 mg/L
01/11/2015	16.3		11.4 mg/L
02/16/2015	12.5		11.4 mg/L
02/17/2015	15.4		11.4 mg/L
02/23/2015	27.1		11.4 mg/L
02/24/2016	25.7		11.4 mg/L
03/2/2015	26.6		11.4 mg/L
03/3/2015	24.4		11.4 mg/L
03/10/2015	19		11.4 mg/L
01/3/2016	12.9	Monthly Average	12.4 mg/L
01/17/2016	19	Daily Maximum Limit	11.4 mg/L
01/18/2016	15.6		11.4 mg/L
01/25/2016	20.9		11.4 mg/L
01/27/2016	19.5		11.4 mg/L
02/3/2016	12.9		11.4 mg/L
12/15/2016	12.6		11.4 mg/L
12/19/2016	14.5		11.4 mg/L
12/20/2016	16.8		11.4 mg/L
12/21/2016	18.1		11.4 mg/L
01/9/2017	23		11.4 mg/L
01/10/2017	16.9		11.4 mg/L

2.3.3 TSS

There were 6 TSS exceedances at the WWTP between December 2015 and May 201, these exceedances are listed in Table 3. Yorkville's WPDES permit limit for TSS is 40mg/L for a weekly average and 20 mg/L for the monthly average. The existing final clarifier shares a common wall with the aeration tank and has ports located at the bottom to convey RAS back to the aeration tank. Due to the ports in the tank there is no control over the facility's sludge blanket through RAS pumping.

Table 3 –
TSS Exceedances

Date	Result Amount	Description	Limit Amount
12/01/2015	25.3 mg/L	Monthly Average	20 mg/L
12/08/2015	33.9 mg/L	Weekly Average	30 mg/L
01/03/2016	41.4 mg/L	Monthly Average	20 mg/L
01/10/2016	56.5 mg/L	Weekly Average Limit	30 mg/L
01/17/2016	39.7 mg/L		30 mg/L
05/01/2016	30.1 mg/L		30 mg/L

2.3.4 Chlorides

There were 55 exceedances for the weekly average chloride limit from January 28, 2013 to September 8, 2017. Chlorides are being addressed through a revised source reduction measures plan outside the scope of this report. A revised SRM was submitted to WDNR on September 20, 2018. In addition, the Village of Yorkville has since received a written commitment from Racine County Public Works on the actions being implemented to reduce chloride discharges to the WWTP from their grounds/facilities located immediately north of the WWTP. This correspondence is included as Appendix B to this report.

Table 4 –
Chloride Exceedances

Date	Result Amount	Description	Limit Amount
01/28/2013	712 mg/L	Weekly Average Limit	710 mg/L
05/11/2013	465.3 mg/L		450 mg/L
09/15/2013	694.7 mg/L		450 mg/L
10/23/2013	454.5 mg/L		450 mg/L
11/22/2013	454.5 mg/L		450 mg/L
01/18/2014	1222.5 mg/L		710 mg/L

Date	Result Amount	Description	Limit Amount
02/15/2014	1011.3 mg/L		710 mg/L
02/23/2014	1315 mg/L		710 mg/L
03/01/2014	995 mg/L		710 mg/L
04/12/2014	776.7 mg/L		710 mg/L
04/15/2014	772 mg/L		710 mg/L
05/03/2014	705.5 mg/L		450 mg/L
06/01/2014	570 mg/L		450 mg/L
07/04/2014	561.8 mg/L		450 mg/L
09/07/2014	473 mg/L		450 mg/L
10/18/2014	476.8 mg/L		450 mg/L
11/08/2014	588.8 mg/L		450 mg/L
12/01/2014	712 mg/L		710 mg/L
01/10/2015	1437.5 mg/ L		710 mg/L
03/08/2015	872.8 mg/L		710 mg/L
04/04/2015	885.8 mg/L		710 mg/L
05/16/2015	695.8 mg/L		450 mg/L
06/06/2015	550 mg/L		450 mg/L
06/08/2015	590 mg/L		450 mg/L
07/18/2015	560 mg/L		450 mg/L
08/08/2015	520.8 mg/L		450 mg/L
09/21/2015	534 mg/L		450 mg/L
09/22/2015	566 mg/L		450 mg/L
10/10/2015	555.3 mg/L		450 mg/L
11/01/2015	534.8 mg/L		450 mg/L
01/24/2016	809 mg/L		710 mg/L
02/13/2016	774 mg/L		710 mg/L
02/15/2016	799 mg/L		710 mg/L
03/14/2016	730 mg/L		710 mg/L
04/16/2016	734.3 mg/L		710 mg/L
05/07/2016	673 mg/L		450 mg/L
05/08/2016	598.3 mg/L		450 mg/L
07/09/2016	552.8 mg/L		450 mg/L
08/20/2016	516.5 mg/L		450 mg/L
08/22/2016	540.5 mg/L		450 mg/L
09/06/2016	519.5 mg/L		450 mg/L
09/08/2016	500.5 mg/L		450 mg/L
10/01/2016	501.3 mg/L		450 mg/L

Date	Result Amount	Description	Limit Amount
11/12/2016	533.3 mg/L		450 mg/L
11/15/2016	543 mg/L		450 mg/L
12/26/2016	791.7 mg/L		710 mg/L
01/14/2017	800 mg/L		710 mg/L
01/15/2017	785.7 mg/L		710 mg/L
05/13/2017	541.5 mg/L		450 mg/L
05/15/2017	533.5 mg/L		450 mg/L
06/11/2017	619 mg/L		450 mg/L
08/05/2017	537 mg/L		450 mg/L
08/08/2017	558 mg/L		450 mg/L
09/05/2017	456.3 mg/L		450 mg/L
09/08/2017	512 mg/L		450 mg/L

3 Design Criteria

3.1 Design Year

Based on a meeting with WDNR staff on August 22, 2018, the reissued WPDES permit will contain a two (2) year compliance schedule to address current NOV's, from the effective date of the reissued permit. The preliminary schedule is for WDNR to reissue the permit effective April 30, 2019.

To satisfy the Village's NOV compliance, this plan will focus on 5-year growth projections while also addressing existing deficiencies which led to the NOVs. A 5-year timeframe allows the community to reevaluate their growth projections accordingly in 2023.

3.2 Current NOV Related Discharge Permit Requirements

As defined by the current WPDES Permit, current discharge limits are presented in Table 5.

Table 5 –
Current NOV Related Effluent Permit Limits

Parameter	Daily Maximum	Weekly Average	Monthly Average
BOD_5		30 mg/L	20 mg/L
TSS		30 mg/L	20 mg/L
Chloride (May-Nov)		450 mg/L	
Chloride (Dec-Apr)		710 mg/L	
Nitrogen, Ammonia (NH_3-N) (Nov-Apr)	11.4 mg/L	31 mg/L	12.4 mg/L
Nitrogen, Ammonia (NH_3-N) (May-Oct)	Monthly monitoring only from May through October		

3.3 Future NOV Related Discharge Permit Requirements

Based on preliminary limit calculations memo completed by WDNR, provide to SEH on July 23, 2018, it is anticipated that NOV related parameters will have effluent limits as shown in Table 2 in the next Yorkville permit reissuance. The draft WQBEL memo is included as Appendix C. As shown, ammonia limits will become even more stringent in the subsequent permit reissuance with new limits from May to October, as well as new daily maximum ammonia limits year-round based on effluent pH.

Table 6 –
Future NOV Related Effluent Limits

Parameter	Daily Maximum	Weekly Average	Monthly Average
BOD_5		30 mg/L	20 mg/L
TSS		30 mg/L	20 mg/L
Ammonia Nitrogen November – April May-October	 ***pH variable*** ***pH variable***	 ***29 mg/L*** ***5.1 mg/L***	 ***12.4 mg/L*** ***2.2 mg/L***
Chloride	760 mg/L 950 lbs/day	400 mg/L 490lbs/day	400mg/L

3.4 Projected Flows & Loadings

The projected flows and loadings for Yorkville are found in Table 7.

Table 7 –
5-Year Flow and Loading Projections

Flow	Units	Existing	5-Year	Peaking Factors
Year		**2018**	**2023**	
Minimum Month (at startup)	MGD	0.059	0.218	0.8
Average Annual	MGD	0.071	0.263	N/A
Maximum Month	MGD	0.097	0.361	1.4
Maximum Week	MGD	0.114	0.422	1.6
Peak Day	MGD	0.199	0.738	2.8
Peak Hour	MGD	0.213	0.790	3.0(1)
BOD_5 (2)				
Average Annual	mg/L	197	**200**	
	lb/d	117	439	
Maximum Month	lb/d	206	778	1.77
Peak Day	lb/d	616	2,320	5.28
TSS(2)				
Average Annual	mg/L	130	**250**	
	lb/d	77	549	
Maximum Month	lb/d	122	868	1.58
Peak Day	lb/d	346	2,466	4.49
TP				
Average Annual	mg/L	5.5		
	lb/d	3	12	
Maximum Month	lb/d	5	18	1.47
Peak Day	lb/d	10	36	3.02

Notes:
1) Assumed.
2) Assumes future BOD and TSS concentrations are equivalent to domestic strength wastewater as defined in current Yorkville sewer ordinance.

4 Identification of Alternatives

4.1 Cost Effectiveness Analysis

A cost effectiveness analysis is performed to determine which wastewater treatment alternative will minimize total resource cost for the design life of the facilities and remain compatible with water quality goals. In a cost effectiveness analysis using the present worth analysis method, future costs are reduced to their present worth cost and summarized for each alternative. Future expenditures are converted to a present worth cost at the beginning of the planning period. The planning period is a time span for which alternative wastewater collection and treatment facilities are evaluated for cost effectiveness. Typically a 20-year planning period is selected which corresponds to the design life of much of the process equipment.

The total capital investment includes:

1. Initial capital construction costs plus engineering, legal, and administrative costs.
2. The capital costs necessary for major equipment replacement during the planning period. All future costs are discounted to the present using a single payment present worth factor computed at 3-7/8 percent; the present federally mandated discount rate. This yields the amount of money that must be theoretically invested at 3-7/8 percent when the project is initially constructed so that the capital required for equipment replacement would be available when such expenditures are required.

The salvage value at the end of the planning period, which represents a credit, must also be considered in the present worth costs. Structures and equipment with a service life extending beyond the 20 year planning period are considered to have a salvage value. Straight line depreciation methods are used to determine the salvage value for these components. The single payment present worth factor computed at 3-7/8 percent is also applied to the total salvage value. The resulting present worth is subtracted from the present worth cost for each alternative.

The values of operation and maintenance costs that occur during the planning period are discounted to a present worth. Only the operating costs that are impacted by the treatment alternatives such as chemical costs, aeration power costs, and solids handling and disposal are considered. All other operating costs are the same for all alternatives and are not included in the present worth analyses. The value of operation and maintenance costs that occur during the planning period is obtained by multiplying the estimated average operation and maintenance expenses during the 20 year planning period by a series present worth factor computed at 3-7/8 percent. This yields the amount of money that must be theoretically invested at 3-7/8 percent when the project is initially constructed so that the annual operation and maintenance expenses can be paid each year for the 20 year facilities design life.

Inflation of costs during the planning period was not considered in the analysis as specified in the Environmental Protection Agency (EPA) guidelines. Therefore, all costs quoted are based on September 2018 costs including future replacement costs and salvage values. The employed assumption is that all prices involved will tend to change by approximately the same percentage; thus, the results and conclusions drawing from the present worth cost analysis will not be affected by changes in the general level of prices.

4.1.1 Raw Wastewater Pumping

The existing raw wastewater pumps have adequate capacity for existing peak flows, however should short term growth proceed as projected, will exceed their rated capacity. Additionally, the pumping head required may change depending on the downstream unit processes utilized for addressing current NOV's. Two alternatives will be estimated, including:

1. Do Nothing.
2. Replace Pumps with pumps size for 5-Year peak hour flows and future head requirements.

4.1.2 Fine Screening

The existing fine screen does not have age, condition or capacity related deficiencies. The fine screen can continue to be utilized depending on the primary or secondary treatment method utilized to address NOV related deficiencies. For an MBR alternative, the existing fine screen would require replacement with a 2 mm drum screen upstream of the MBR. For primary filtration, only coarse screening would be required upstream. For both an SBR or granular sludge process the existing fine screen is adequate. The following fine screening options will be investigated:

1. Do Nothing.
2. Replace with 2 mm fine screen.
3. Remove and replace with raw wastewater grinder pumps upstream of primary filtration.

4.1.3 Grit Removal

Yorkville's WWTP is not currently equipped with grit removal facilities. Should an MBR, SBR or granular sludge technology be chosen as a future NOV compliance alternative, new grit removal facilities are recommended. Under a primary filtration alternative, some primary filter technologies are capable of removing coarse grit, however, the filter life is reduced.

1. Do Nothing.
2. Add stacked tray vortex grit removal.

4.1.4 Primary Treatment

Yorkville's WWTP is not currently equipped with any form of primary treatment. Primary treatment technologies can be added to the current unit processes to reduce downstream loadings on the secondary treatment process. Given the existing site's space limitations, a conventional primary clarifier is not feasible as a future primary treatment alternative. The following primary treatment alternatives were investigated:

1. Do Nothing and address NOV's using a new secondary treatment technology.
2. Add a rotating filter belt for primary filtration and combine with secondary treatment improvements.
3. Add cloth media primary filtration and combine with secondary treatment improvements.

4.1.5 Secondary Treatment

The aeration basin in the existing package plant has several deficiencies as noted in Section 3 of this report. As such, improvements to the existing secondary treatment process currently utilized are critical to compliance with the current NOV's and future permit limits. This Section will identify both feasible improvements to the existing package plant as well as technologies to replace the existing package plant.

4.1.5.1 Replacement Technologies

Several technologies exist that provide increased removal performance over the existing package plant, require minimal footprint, and allow for flow and loading increases in the short-term. Three replacement technologies were evaluated to replace the existing package plant as noted below:

1. Replace Package Plant with a membrane bioreactor (MBR).
2. Replace Package Plant with a sequencing batch reactor (SBR).
3. Replace Package Plant with and aerobic granular sludge technology (AquaNereda®).

4.1.5.2 Improvements to Existing Package Plant

Improvements to the existing package plant need to address deficiencies described earlier in this report, namely the ability to pump and control RAS flow rates to maintain minimum sludge blankets, the ability to better control WAS rates to provide additional retention time, and provide supplemental aeration capacity as loadings increase. The following alternatives are included to address improvements to the existing package plant:

1. Do Nothing – Utilize existing tankage for flow equalization or sludge storage in conjunction with one of the replacement technologies described above.
2. Construct a new final clarifier complete with RAS and WAS pumping, add supplemental aeration, and combine with primary filtration as increased organic loadings dictate.

4.2 Alternative 1 – MBR

This alternative considers complete replacement of the existing package plant with a new MBR constructed to the north of the existing package plant. The MBR would be designed for 5-Year projections and operated to achieve low effluent TP and TN limits, and would address the NOV's for BOD, TSS, and ammonia. The proposed system would consist of a single aeration tank followed by two membrane tanks, as well as associated blowers, membrane modules, permeate pumps, RAS pumps and associated controls.

Additional modifications required to the existing facility upstream of the new MBR include a new 2 mm perforated plate fine screen, new stacked tray vortex grit removal, and replacement of the existing raw wastewater pumps to pump to the new preliminary treatment system upstream of the new MBR. The new preliminary treatment equipment would be house in a new building that also houses the ancillary MBR equipment such as blowers, permeate pumps and chemical feed systems, which would be located adjacent to the new MBR system.

The existing aeration tank will be repurposed under this alternative to serve as pre-equalization. The existing final clarifier would be repurposed to serve as additional liquid sludge storage.

An MBR has several advantages over both the existing package plant and other alternatives to be defined in the following sections, including:

- Highest quality effluent.
- Smallest footprint (no final clarifier, high operating MLSS).
- Proven process with many full scale installations.
- Would not require upgrades to address future phosphorus limits.

The MBR system also has several disadvantages over other alternatives, including:

- Highest equipment capital costs.
- Requires pre-equalization.
- Requires 2 mm fine screening upstream.
- Highest energy use.
- Requires membrane cleaning chemicals.

4.3 Alternative 2 – SBR

Alternative 2 considers replacement of the existing package plant with a new sequencing batch reactor constructed north of the existing tanks. Specifically, this alternative considers a continuous flow "hybrid" SBR which eliminates the need to constructed dedicated equalization facilities. The SBR would also be designed for 5-year projections, and operated to biologically remove TP and TN. This alternative would also address the NOV's for BOD, TSS, and ammonia. This alternative consists of a two-tank SBR, with each tank equipped with a pre-react zone, which allows for continuous feed, which is not capable with traditional SBR's. Other ancillary items include decanters, blowers, diffusers, waste sludge pumps, submersible mixers and controls.

Additional modifications to the existing facility include replacement of the raw wastewater pumps, relocation of the existing fine screen, installation of a new vortex grit removal system, and modification of existing tanks to serve as liquid sludge storage and equalization.

An SBR has advantages over the other alternatives which include:

- Also does not require construction of a final clarifier.
- Operational flexibility to run in several modes to target different treatment objectives.
- Lowest initial capital cost.
- Proven process with many full-scale installations.

However, an SBR also has several disadvantages:

- Unfamiliar process to current operations staff.
- Larger footprint than MBR or Nereda system.
- Would require tertiary treatment to address future TP limits.

4.4 Alternative 3 – Nereda

The aerobic granular sludge system (AquaNereda) is a relatively new technology that is similar to an SBR system, however is operated in a way such that activated sludge "granules" are formed via selective wasting of sludge. The formation of these granules allows for several improvements over a typical SBR system, which include higher operating MLSS, faster settling and decant of waste sludge, and the ability to operate the basins for biological nutrient removal (BNR).

This alternative considers the same improvements as Alternative 2, with the exception that the SBR is replaced by an AquaNereda system. The AquaNereda system does also require both pre- and post-equalization.

The advantages of the Nereda system over other alternatives are:

- Similar footprint to that of MBR (ability to operate at high MLSS).
- Reduced energy costs vs MBR.

- Better effluent quality than SBR or upgrade of existing package plant.

The disadvantages of the Nereda system compared to other alternatives described are:

- Highest initial capital cost.
- Unfamiliar process to current operations staff.
- Relatively new process with few full-scale installations.

4.5 Alternative 4 – Primary Filtration, Final Clarifier & RAS/WAS Pumping, Supplemental Aeration

The final alternative considers reuse of the existing package plant for treatment, but also considers construction of a new final clarifier with RAS and WAS pumping facilities, a new primary filtration unit process to reduce organic and TSS loadings to the existing aeration tank, and supplemental aeration in the existing aeration tank.

Under this alternative a new 40 ft. diameter final clarifier would be constructed north of the existing package plant. A new building would be constructed adjacent to the clarifier which would house RAS and WAS Pumps, as well as a new primary filtration unit. The raw wastewater pumps would also be replaced as part of this alternative to pump to the new primary filtration unit. Sludge removed from the primary filtration unit will be dewatered and disposed of at a landfill along with screenings.

Depending on the aeration technology selected, new blowers for a new jet aeration system would also be housed in the new building. An alternative is constructing aspirator-aerators at the existing basin to supplement aeration.

Advantages to this alternative are as follows:

- Lower initial capital cost than an MBR or Nereda system.
- Clarifier and RAS/WAS pumping can be constructed initially, with primary filtration and aeration improvements phased in as growth dictates to spread out costs.
- Final clarifier is a familiar unit process to operations staff.

Disadvantages to this alternative are as follows:

- Retains much of the aging infrastructure of the existing facility in service.
- Existing aeration tank is still a limiting capacity factor.
- Large footprint for relatively small increase in treatment capacity, as a final clarifier is still required.
- Little operational flexibility to operate with different treatment objectives such as biological nutrient removal.

4.6 Comparative Analysis of Alternatives

NR 110.09(3)(c) requires a facility plan to have a comparative analysis of feasible alternatives based on four criteria: “capital and operating costs; significant primary and secondary environmental effects; physical, legal or institutional constraints; and whether or not they meet regulatory requirements.” This section will review each of these criteria.

4.6.1 Capital and Operating Costs

4.6.1.1 Capital Costs

A detailed cost estimate for Alternative 1 is provided in Appendix D. The estimated capital present worth cost for this alternative is $5,335,000, including engineering and contingencies.

A detailed cost estimate for Alternative 2 is provided in Appendix D. The estimated capital present worth cost for this alternative is $4,003,000, including engineering and contingencies.

A detailed cost estimate for Alternative 3 is provided in Appendix D. The estimated capital present worth cost for this alternative is $6,058,000, including engineering and contingencies.

A detailed cost estimate for Alternative 4 is provided in Appendix D. The estimated capital present worth cost for this alternative is $4,138,000, including engineering and contingencies.

4.6.1.2 Operation & Maintenance Costs

Additional refinement of operation and maintenance costs will be required during facility plan preparation to provide more accurate annual O&M costs.

Operation, maintenance and replacement costs (O, M and R) for a new MBR mechanical plant are estimated at an additional $44,400/year.

Operation, maintenance and replacement costs (O, M and R) for a new SBR mechanical plant are estimated at an additional $31,500/year.

Operation, maintenance and replacement costs (O, M and R) for a new Nereda mechanical plant are estimated similar to that of the SBR in Alternative 2, at approximately an additional $31,500/year.

Operation, maintenance and replacement costs (O, M and R) for a new final clarifier with RAS and WAS Pump and primary filtration are estimated at approximately and additional $20,500/year.

4.6.2 Significant Primary and Secondary Environmental Effects

4.6.2.1 Primary Environmental Impacts

All four alternatives will be able to achieve the goals for addressing the current NOV's and providing adequate wastewater treatment for short term growth once the new facilities are completed. All will produce a positive impact upon the receiving stream. The effluent quality produced by Alternative 1 will be the highest, as this alternative includes membrane filtration.

4.6.2.2 Reliability of Treatment

Alternatives 1, 2 and 3 all require pre-equalization tanks to address peak flows, as each of these technologies is not well suited to function reliably when stressed with peak flows greater than 2:1. Alternative 4 will provide the greatest reliability without utilization of additional equalization, however this alternative does maintain more of the aging equipment in service, which could potentially lead to a less reliable treatment overall.

4.6.2.3 Secondary Environmental Impacts

All four Alternatives have construction occurring on the current property on land that has been previously disturbed. Environmental impact is expected to be minimal with no disruption of wooded areas, wetlands, meadows or other critical environments. Should a land purchase be required to construct a new WWTP additional environmental and cultural resource investigation would be required.

4.6.3 Physical, Legal and Institutional Constraints

4.6.3.1 Utilization of Village Staff

Alternatives 1 through 3 replace the existing package plant operations with processes that are not familiar to the Village's current operations staff. Operations staff would require additional training to operate the new technologies employed by each. All four of the alternatives developed would have a higher degree of automation than currently employed, which would reduce the amount of operations attention required.

Alternative 1 consists of a continuous flow process which is similar to the operation of the current facility, however, employs membranes to produce clear permeate as opposed to operation of final clarifiers.

4.6.3.2 Available Land for Future Expansion

One limitation of the existing WWTP site is the availability of land for future construction. It is likely that upon completion of any one of the four alternatives presented above, minimal additional land would be available for future expansion on the existing site.

Given the uncertainty of future long term growth related to the Foxconn development, it is recommended that long term treatment alternatives beyond addressing the current NOV's also investigate constructing a new facility located on a new site. Preliminary investigations have been started during preparation of this report. For NOV compliance and projected short term growth, it is not recommended to invest in constructing a new facility on a new site. Several drawbacks to addressing the NOV by constructing on a new site are:

- Additional cost for land acquisition.
- Additional regulatory burden, including: environmental and cultural resources impact reviews, potential wetland and floodplain permitting, and stringent phosphorus effluent limits would apply immediately.
- Required construction of a lift station and force main from the existing facility to the new WWTP site.
- Uncertainty of future long-term growth.

4.6.3.3 Length of Construction Period

The length of construction period for Alternatives 1, 2, 3 and 4 would each be in the range of 1 to 1 1/2 years. Each of the four alternatives was developed to allow construction to proceed with minimal impact to the operations of the existing package plant. Short duration cutovers would be required for each alternative.

4.6.4 Regulatory Requirements

All three alternatives will be able to achieve the immediate goals for providing adequate wastewater treatment once the new facilities are completed. All will produce a positive impact upon the receiving stream. Alternative 1 would also provide treatment equivalent to tertiary treatment and likely also comply with future phosphorus limits once Yorkville's phosphorus variance expires. Alternatives 2, 3 and 4 would require future tertiary treatment improvements to comply with future phosphorus limits.

5 Conclusions and Recommendations

5.1 Recommended Plan

Given the current deficiencies at Yorkville's WWTP the current NOV, and more stringent effluent limits in the forthcoming permit reissuance, SEH recommends Yorkville proceed with Alternative 2, to address NOVs, future limits and short term growth. This alternative is the lowest initial capital cost and has the advantage of not relying on much of the existing aged infrastructure for much of the future treatment, and would provide the Village with flexibility as growth occurs. Additional SBR tanks could be constructed in the future if needed. This alternative includes:

NOV and Short Term Growth Related:

- Construct a new SBR system.
- Construct a new grit removal system.
- Construct interconnecting piping between the existing aeration basin and new system for EQ and sludge storage.
- Convert the existing final clarifier to additional WAS Storage.
- Replace existing Raw Wastewater Pumps.

5.2 Implementation Schedule

The anticipated schedule for implementing the project is outlined below:

Submit NOV Report to DNR	October 2018
Coordinate 1st Edition SSA with SEWRPC	March 2019
DNR Reissues WPDES Permit	April 2019
Submit Facilities Plan Amendment to the DNR	June 2019
DNR Approval of Plan	August 2019
Begin Design	June 2019
Submit Plans and Specifications to the DNR	December 2019
DNR Approval of Plans and Specifications	March 2020
Award of Contract	April 2020
Start Construction	May 2020
End Construction/Startup/Achieve Compliance with NOV	April 2021

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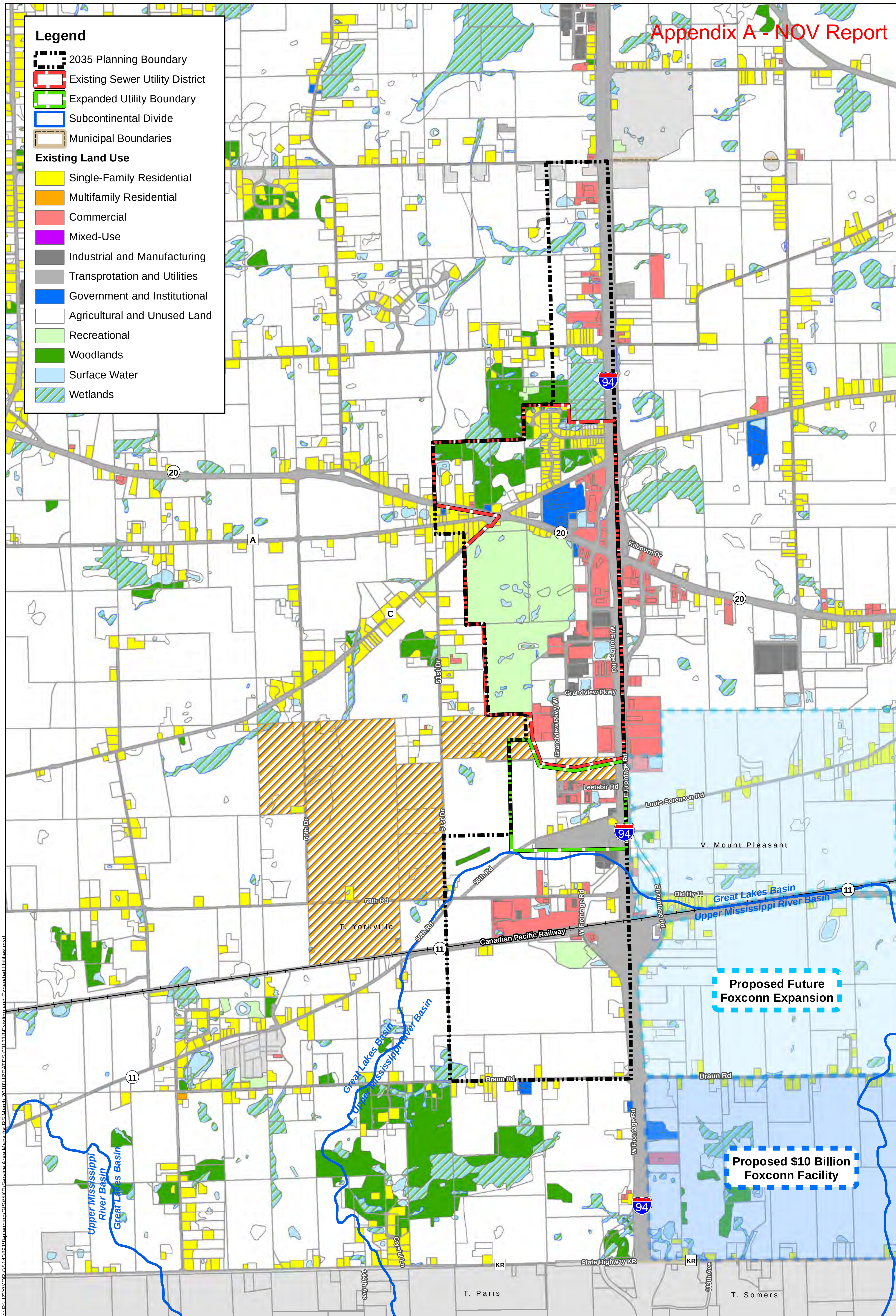
Figure

Figure 1 – Existing and Expanded Utilities



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Ft
0 1,250 2,500

Map by: mfalk
Projection: State Plane Wiscons South FIPS 4803
Source: Racine County
Print Date: 3/15/2018

EXISTING AND EXPANDED UTILITIES BOUNDARY; 2035 COMPREHENSIVE PLANNING BOUNDARY

Town of Yorkville, Racine County, Wisconsin

Appendix A

NOV Correspondence

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
2300 N. Dr. Martin Luther King, Jr. Dr.
Milwaukee, WI 53212-3128

Scott Walker, Governor
Daniel L. Meyer, Secretary
Telephone 608-266-2621
FAX 608-267-3579
TTY Access via relay - 711

WISCONSIN DEPT. OF NATURAL RESOURCES

October 24, 2017

Racine County
Personal Service Requested

Peter Hansen, Chairman
Town of Yorkville
925 15th Avenue
Union Grove, WI 53182

Subject: NOTICE OF VIOLATION/NOTICE OF CLAIM/ENFORCEMENT CONFERENCE – November 15, 2017

Dear Chairman Hansen:

The Department of Natural Resources (department) has reason to believe that the Town of Yorkville (Town) is in violation of its Wisconsin Pollution Discharge Elimination System Permit #WI-0029831-08-1, effective April 1, 2013 (WPDES Permit), located at The Yorkville Sewer Utility District No. 1, 14100 Washington Avenue, Sturtevant, Racine County, Wisconsin (POTW). The Department alleges the following violations:

1. **WPDES Permit Condition 2.2.1 – Sampling Point (Outfall) 001 – Monitoring Requirements and Effluent Limitations: The permittee shall comply with the following monitoring requirements and limitations for Chloride, Biological Oxygen Demand (BOD5), Total Suspended Solids (TSS) and Nitrogen, Ammonia:**

The department's reviews of the Town's Wastewater Discharge Monitoring Reports and Compliance Maintenance Annual Reports since January of 2013 identified exceedances for Chloride, BOD5, TSS and Nitrogen, Ammonia. See Exhibit 01 for tables identifying specific exceedances.

The department issued Notices of Noncompliance on May 7, 2015 and June 30, 2016 requesting the Town address the exceedances. Based on sampling results since June 30, 2016, the Town continues to exceed limitations within their WPDES Permit.

2. **WPDES Permit Condition 5.2.1 – Noncompliance Notification: The permittee shall report the following types of noncompliance by telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:**

   - **any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the Permit, either for effluent or sludge.**

Since 2013 the Town's Monthly Discharge Monitoring Reports (DMR) identified exceedances of pollutants listed in the Permit, see Appendix A for details. The department has no record of the Town conducting a phone call to the department making a notification within 24 hours of becoming aware of the exceedances. The department has been first learning of the exceedances upon submittal of the Town's DMRs.

We have scheduled the following Enforcement Conference to discuss this matter in more detail:

Conference Date:	**November 15, 2017**
Conference Time:	**10:00 a.m.**
Location:	**Department of Natural Resources Southeast Region Headquarters 2300 N. Dr. Martin Luther King, Jr. Drive Milwaukee, WI 53212**

We request you attend the Enforcement Conference as it is an important opportunity to discuss the circumstances surrounding the alleged violations and to learn your perspective on this matter. Please note that in an effort to encourage a candid and productive conversation, attendance is limited to you, your legal counsel and others with the technical expertise necessary to understand, evaluate and correct the violation. A fact sheet describing the Enforcement Conference is enclosed.

Please bring with you to the Enforcement Conference the Town's plans to achieve compliance with their WPDES Permit and discontinue unpermitted discharges from their POTW.

The department's enforcement decision will be based upon available information if you do not attend.

Please be advised the department is authorized to seek injunctive or other appropriate relief for violations of pollution discharge elimination laws, including forfeitures of not more than $10,000 per day of violation pursuant to s. 283.91(2), Wis. Stats. Each day of violation is considered a separate offense.

This Notice of Violation fulfills the requirements of s. 893.80(1), Wis. Stats., which requires that a written notice of the circumstances of a claim be served on the governmental subdivision or agency within 120 days after the happening of the event which gave rise to the claim.

If you have questions or need to reschedule please contact me at (414) 263-8663.

Sincerely,

Benton C. Stelzel
Environmental Enforcement Specialist

Enclosure: Exhibit A, Map, Enforcement Conference Fact Sheet

c: G. Thielen – DNR/SER Milwaukee

Exhibit A

Chloride Exceedances			
Date	*Result Amount*	*Description*	*Limit Amount*
01/28/2013	712 mg/L	Weekly Average Limit	710 mg/L
05/11/2013	465.3 mg/L		450 mg/L
09/15/2013	694.7 mg/L		450 mg/L
10/23/2013	454.5 mg/L		450 mg/L
11/22/2013	454.5 mg/L		450 mg/L
01/18/2014	1222.5 mg/L		710 mg/L
02/15/2014	1011.3 mg/L		710 mg/L
02/23/2014	1315 mg/L		710 mg/L
03/01/2014	995 mg/L		710 mg/L
04/12/2014	776.7 mg/L		710 mg/L
04/15/2014	772 mg/L		710 mg/L
05/03/2014	705.5 mg/L		450 mg/L
06/01/2014	570 mg/L		450 mg/L
07/04/2014	561.8 mg/L		450 mg/L
09/07/2014	473 mg/L		450 mg/L
10/18/2014	476.8 mg/L		450 mg/L
11/08/2014	588.8 mg/L		450 mg/L
12/01/2014	712 mg/L		710 mg/L
01/10/2015	1437.5 mg/L		710 mg/L
03/08/2015	872.8 mg/L		710 mg/L
04/04/2015	885.8 mg/L		710 mg/L
05/16/2015	695.8 mg/L		450 mg/L
06/06/2015	550 mg/L		450 mg/L
06/08/2015	590 mg/L		450 mg/L
07/18/2015	560 mg/L		450 mg/L
08/08/2015	520.8 mg/L		450 mg/L
09/21/2015	534 mg/L		450 mg/L
09/22/2015	566 mg/L		450 mg/L
10/10/2015	555.3 mg/L		450 mg/L
11/01/2015	534.8 mg/L		450 mg/L
01/24/2016	809 mg/L		710 mg/L
02/13/2016	774 mg/L		710 mg/L
02/15/2016	799 mg/L		710 mg/L

03/14/2016	730 mg/L		710 mg/L
04/16/2016	734.3 mg/L		710 mg/L
05/07/2016	673 mg/L		450 mg/L
05/08/2016	598.3 mg/L		450 mg/L
07/09/2016	552.8 mg/L		450 mg/L
08/20/2016	516.5 mg/L		450 mg/L
08/22/2016	540.5 mg/L		450 mg/L
09/06/2016	519.5 mg/L		450 mg/L
09/08/2016	500.5 mg/L		450 mg/L
10/01/2016	501.3 mg/L		450 mg/L
11/12/2016	533.3 mg/L		450 mg/L
11/15/2016	543 mg/L		450 mg/L
12/26/2016	791.7 mg/L		710 mg/L
01/14/2017	800 mg/L		710 mg/L
01/15/2017	785.7 mg/L		710 mg/L
05/13/2017	541.5 mg/L		450 mg/L
05/15/2017	533.5 mg/L		450 mg/L
06/11/2017	619 mg/L		450 mg/L
08/05/2017	537 mg/L		450 mg/L
08/08/2017	558 mg/L		450 mg/L
09/05/2017	456.3 mg/L		450 mg/L
09/08/2017	512 mg/L		450 mg/L

Nitrogen, Ammonia Exceedances			
Date	*Result Amount*	*Description*	*Limit Amount*
02/17/2014	11.8 mg/L		11.4 mg/L
01/10/2015	17.5 mg/L		11.4 mg/L
01/11/2015	16.3 mg/L		11.4 mg/L
02/16/2015	12.6 mg/L		11.4 mg/L
02/17/2015	15.4 mg/L	Daily Maximum Limit	11.4 mg/L
02/23/2015	27.1 mg/L		11.4 mg/L
02/24/2015	25.7 mg/L		11.4 mg/L
03/02/2015	26.6 mg/L		11.4 mg/L
03/03/2015	24.4 mg/L		11.4 mg/L
03/10/2015	19 mg/L		11.4 mg/L
01/03/2016	12.9 mg/L	Monthly Avg.	12.4 mg/L
01/17/2016	12.7 mg/L		11.4 mg/L
01/18/2016	15.6 mg/L		11.4 mg/L
01/25/2016	20.9 mg/L	Daily Maximum Limit	11.4 mg/L
01/27/2016	19.5 mg/L		11.4 mg/L
02/03/2016	12.9 mg/L		11.4 mg/L
12/15/2016	12.6 mg/L		11.4 mg/L

12/19/2016	14.5 mg/L		11.4 mg/L
12/20/2016	16.8 mg/L		11.4 mg/L
12/21/2016	18.1 mg/L		11.4 mg/L
01/09/2017	23 mg/L		11.4 mg/L
01/10/2017	16.9 mg/L		11.4 mg/L

BOD5 Exceedances

Date	*Result Amount*	*Description*	*Limit Amount*
01/03/2016	67.1 mg/L	Monthly Avg.	20 mg/L
01/03/2016	51 mg/L	Weekly Average Limit	30 mg/L
01/11/2016	39 mg/L		30 mg/L
01/17/2016	63 mg/L		30 mg/L
01/25/2016	115.3 mg/L		30 mg/L
04/04/2016	22.1 mg/L	Monthly Avg.	20 mg/L
05/01/2016	31.5 mg/L	Weekly Average Limit	30 mg/L
07/24/2017	*93.7 mg/L		30 mg/L

TSS Exceedances

Date	*Result Amount*	*Description*	*Limit Amount*
12/01/2015	25.3 mg/L	Monthly Avg.	20 mg/L
12/08/2015	33.9 mg/L	Weekly Avg.	30 mg/L
01/03/2016	41.4 mg/L	Monthly Avg.	20 mg/L
01/03/2016	48.2 mg/L	Weekly Average Limit	30 mg/L
01/10/2016	56.5 mg/L		30 mg/L
01/17/2016	39.7 mg/L		30 mg/L
05/01/2016	30.1 mg/L		30 mg/L

WISCONSIN DEPT. OF NATURAL RESOURCES

Environmental Enforcement Conference

An Enforcement Conference (EC) is a meeting between Department of Natural Resources staff and representatives of a person or business that the Department believes has violated an environmental law. The Department issues a Notice of Violation (NOV) when it has reason to believe that a violation of a permit condition, administrative rule or statutory requirement has occurred. The NOV either offers or schedules an EC.

Why Should I Attend?
The EC is an important opportunity to discuss the Department's basis for the alleged violation(s) and learn more about what happened, why it may have happened, and any factors you believe the Department should consider, such as steps that have been or will be taken to stop the violation, correct any effects of the violation, and prevent violations from occurring in the future. It is also your opportunity to explain why you might disagree with the factual and legal conclusions underlying the NOV.

Historic data shows that most violations are resolved at the EC level, without the need for court ordered compliance and/or penalties. In situations where the significance of the violation warrants further enforcement action, your cooperative efforts to resolve the violation and prevent future violations will help minimize your legal and financial liability.

Who Should Attend the EC?
Department staff involved in the EC typically consists of an Environmental Enforcement Specialist and regulatory staff that are familiar with the issues identified in the NOV.

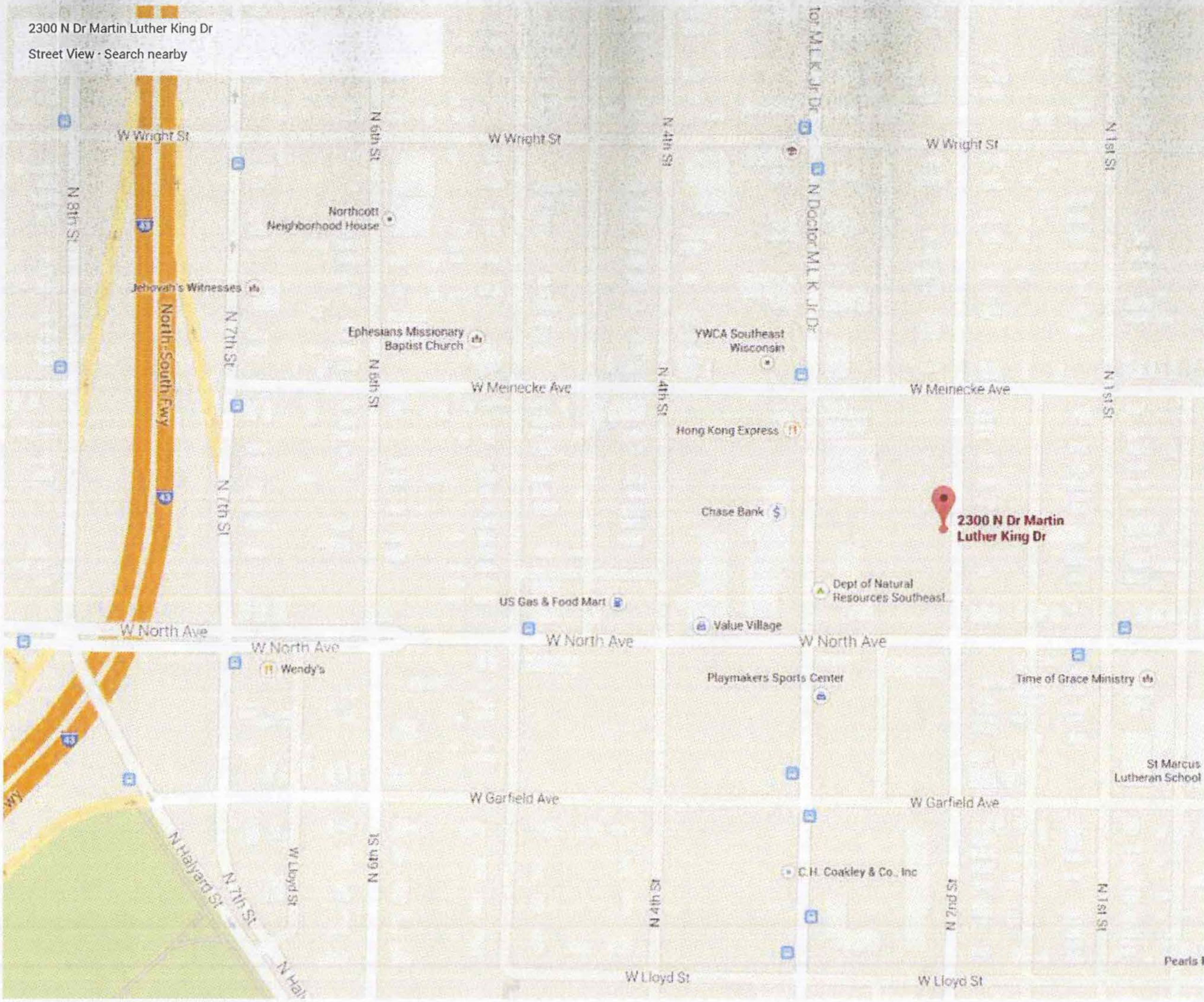
While not required, you may seek representation by legal counsel or the assistance of an environmental consultant to prepare for and/or attend the EC. The EC is most productive when all involved are well-prepared to discuss the allegations and any corrective actions that may be necessary.

To ensure a productive candid discussion, participation in the EC is limited to the person or business involved and others with the legal or technical expertise necessary to understand, evaluate, mitigate and correct the violation. The EC is not an open meeting under state law and the Department will limit participation to those directly involved in the resolution of the matter.

What Happens if I don't Attend the EC?
If a party is unable to attend the EC, they should immediately contact the Environmental Enforcement Specialist at the phone number in the NOV to reschedule. When a party refuses to attend the EC and provides no further information to the Department, the Department's enforcement decision will be based upon available information.

What Happens Following the EC?
The EC is part of the Department's stepped enforcement process. At the EC, Department staff will explain the process and options available to address the alleged violation. Generally, the options range from closing the matter with no further action to referral to the Wisconsin Department of Justice (DOJ) or to U.S. EPA, for further enforcement action. In limited circumstances, the Department can issue citations, which are handled in local court similar to traffic offenses. If a case is referred to DOJ, the DOJ may initiate an action in court on behalf of the State. The State typically asks the Court to impose financial penalties and order completion of any necessary corrective actions. In most of the Department's cases, a cooperative return to compliance with any necessary restoration results in close out of the case. At close out, the Department will send a letter advising of no further enforcement action.

Appendix A - NOV Report



Map data ©2014 Google 200 ft

State of Wisconsin
Department of Natural Resources

Appendix A - NOV Report

CERTIFICATE OF SERVICE OF NOTICE OF CLAIM

(Pursuant to Section 893.80, Wis. Stats.)

I hereby certify that on (Date) 10/24/17 at (Time) 9:10 am/pm,

I did serve a Notice of Claim on:

Peter Hansen, Chairman
Town of Yorkville
925 15th Avenue
Union Grove, WI 53182

HOW THE NOTICE WAS SERVED

☐ I handed a copy to the above named person.

☐ I exhibited and read it to the person to whom it is directed.

☒ I left a copy thereof at the office or home of the above named person with:

Michael McKinney, Clerk-Treasurer
(Name and Title)

☒ The above named person was known to me or identified themselves to be the above named person.

☐ The person served was asked to sign this document as acknowledgment of receipt of the original document and refused.

Signature of Person Served:

(Name) Michael McKinney (Title) Clerk-Treasurer

Signature of Server:

(Name) Geisa Thielen
Geisa Thielen
(Title) wastewater engineer
Wastewater Engineer

Case Name: Yorkville Sewer Utility District No. 1

Appendix A - NOV Report

StaffordRosenbaum LLP
Attorneys

Member of Geneva Group International
The Leading Global Alliance of Independent Professional Firms

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Vanessa D. Wishart
222 West Washington Avenue, Suite 900
P.O. Box 1784
Madison, WI 53701-1784
vwishart@staffordlaw.com
608.210.6307

January 12, 2018

VIA EMAIL

Benton C. Stelzel
Environmental Enforcement Specialist
Wisconsin Department of Natural Resources
141 NW Barstow, Room 180
Waukesha, WI 53188

RE: Follow Up to Yorkville Sewer Utility District No. 1 December 12, 2017 NOV/Enforcement Conference

Dear Mr. Stelzel:

I am writing on behalf of our clients, the Yorkville Sewer Utility Distrcit No. 1, as a follow-up to the December 12, 2017 Enforcement Conference. The District greatly appreciates the opportunity to discuss DNR's concerns regarding chloride, ammonia, BOD, and TSS exceedances at the treatment plant.

As requested at the Enforcement Conference and clarified in a follow-up phone call with you, Yorkville is sending this letter to outline a timeframe in which Yorkville will develop a plan to bring the treatment plant back into compliance with regards to chlorides, ammonia, BOD, and TSS.

Yorkville's commitment to proper operation of its treatment plant was made clear during the Enforcement Conference. To that end, Yorkville will be undertaking the following steps in the future to ensure compliance:

- **Future Treatment Plant Operations**. Yorkville will need to make changes to its service system in the future, either through a facility upgrade or service through another municipal sewerage service system. Yorkville anticipates that it will be able to undertake the following timeframe for constructing a plan for future compliance:

    - January 2018: As of January 5, 2017, Yorkville has been working with SEH on a study to evaluate future treatment alternatives. Yorkville and SEH will be evaluating replacement of the clarifier, complete facility upgrade, and other alternatives such as service through another municipal system.

    - April 2018: the Town of Yorkville will be holding a referendum on incorporation as a village.

    - June 2018: If the referendum is successful, a new village board will be selected by June. Once this occurs, Yorkville will have better direction regarding future facility plans.

    - October 2018: Yorkville anticipates that by October 1, 2018, Yorkville will be able to provide DNR with a concrete plan for future plant operations, which will entail either a facility upgrade or plans for retail service.

  Yorkville will continue to keep DNR informed as this process moves foward.

- **Working with Racine County on chlorides exceedances**. As discussed at length during the Enforcement Conference, a significant part of the chlorides problem facing Yorkville arises from the salt storage and usage at the nearby Racine County Highway Department facility. On December 21, 2017, Yorkville met with Nathan Plunkett and Julie Anderson from Racine County to discuss facility planning and maintenance efforts that can reduce the amount of chlorides infiltrating the sewerage system. Racine County has commissioned a facilities plan for 2018, which will include provisions for chloride remediation. Yorkville is awaiting a scope of services from Racine that will outline the facility plan and chloride remediation efforts. Yorkville understands that it will be receiving this scope of services within the next few weeks and will be scheduling a follow-up meeting with Racine County after reviewing the chloride remediation provisions. After this follow-up meeting, Yorkville anticipates that it will be able to put a plan in place in conjunction with Racine County to address salt storage and use and chloride remediation at the facility and will share this plan with DNR.

- **Developing SOPs**. By February 1, 2018, Yorkville will complete and submit to DNR a written Standard Operating Procedure (SOP) for the addition of mixed liquor to the clarifier to address ammonia exceedances. Yorkville will also be developing and sharing with DNR an SOP for clarifier maintenance.

In addition to these plans for future work, Yorkville has already undertaken a number of steps to remedy past exceedances and to ensure such exceedances do not occur in the future. These steps include the following, which were discussed during the Enforcement Conference and which Yorkville will be continuing to implement per the dates outlined below:

- **Water Softener Replacement**. In 2013, Yorkville hired Culligan to visit all customers and assess compliance with water softener regulations. Yorkville has included a line item in its 2018 budget for water softener replacement, and many customers have replaced their water softeners with the help of this program. Yorkville will continue to include this line item in its budget and facilitate customer water softener upgrades.

- **Infiltration**. Since 2009, Yorkville has been spending approximately $20,000 per year on manhole and chimney seal installation in order to combat chloride infiltration. Over the course of this program, Yorkville has installed 40 chimney seals on manholes. Yorkville will put chimney seals on approximately 5 more manholes over the summer of 2018. Yorkville plans to continue this program until every manhole has a chimney seal.

- **Clarifier Maintenance**. In early 2016, Yorkville retained the services of a consultant to conduct monthly servicing of its clarifier in addition to regular in-house maintenance. Since that time, Yorkville has been spending approximately $3,000 per month for this maintenance service, which has addressed the historic BOD exceedances. This monthly maintenance will continue throughout 2018 and for the foreseeable future.

- **Increase of Mixed Liquor Concentration**. Yorkville has begun increasing the mixed liquor concentration in the clarifier in the fall in anticipation of cold weather in order to prevent ammonia exceedances. However, due to the clarifier design, Yorkville must be cautious with increasing the mixed liquor concentration so as to avoid increases in solids in the clarifier that could result in solids limit exceedances.

- **Notification procedures**. Yorkville has put into place an internal reminder system to ensure that DNR is timely notified of any exceedances.

- **Sampling**. Yorkville conducts unannounced sampling of all its industrial and commercial users on a yearly basis. Yorkville discusses any issues that arise during this sampling process with its users. This sampling protocol will occur again over the summer of 2018. As part of this process, Yorkville will review results for BOD, zinc, chlorides, phosphorus, and ammonia from each industrial or commercial user and conduct follow up discussions and inspections where sampling results indicate is necessary.

Yorkville plans to continue these efforts already put into place. With respect to BOD and TSS, these efforts outlined above have substantially remedied the past exceedance issues, which is clear from the fact that there were no BOD or TSS exceedances in 2017.[1]

Yorkville appreciates this opportunity to communitcate with DNR regarding past exceedances. Yorkville will continue to work diligently with DNR to resolve these issues.

Best regards,

STAFFORD ROSENBAUM LLP

Vanessa W.shart

Vanessa D. Wishart

VDW:mai
Enclosure
cc: Peter Hansen
Gary Hanson
Tim Pruitt
Bryan Hartsook

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[1] DNR documented one BOD exceedance in its NOV from July 24, 2017. However, as Yorkville explained during the Enforcement Conference, this was a contaminated sample and not an exceedance.

Appendix A - NOV Report

StaffordRosenbaum LLP
Attorneys

Member of Geneva Group International
The Leading Global Alliance of Independent Professional Firms

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January 12, 2018

VIA EMAIL

Benton C. Stelzel
Environmental Enforcement Specialist
Wisconsin Department of Natural Resources
141 NW Barstow, Room 180
Waukesha, WI 53188

RE: Yorkville Sewer Utility's Reponse to DNR's January 5, 2018 Enforcment Conference Summary

Dear Mr. Stelzel:

I am writing on behalf of the Yorkville Sewer Utility District No. 1, in response to your Enforcement Conference Summary correspondence from October 30, 2017.

Yorkville appreciates the continued opportunity to work with DNR on this matter. However, Yorkville believes that some of the statements in the summary warrant clarification, in order to ensure the record is reliable and complete. The statements Yorkville would like to clarify are as follows:

- The summary states that "Approximately 35,000 gallons of sludge are hauled from the POTW for disposal yearly." However, Yorkville disposes of about 70,000 gallons per month. In 2017, Yorkville disposed of a total of 910,000 gallons of digested sludge.

- The summary states that "A select few customers significantly contribute to the POTW. If these select customers exceed their discharge limitations the customers store and haul their processed wastewater for treatment rather than discharging to the POTW." To clarify, Yorkville has two customers with a volume limit in their discharge permits. Every customer receives a surcharge when they discharge over the allowed ordinance limits.

- The summary states that "It takes the town approximately 6 weeks to test the entire system utilizing a portable testing device." To clarify, Yorkville owns two portable samplers and a portable flow meter. Yorkville does not sample residential customers.

- The summary accurately describes Yorkville's water softener testing and replacement program, but omits that Yorkville spent over $10,000 for this program.

- The summary states that "The Town suspects that the RCDoT is a significant contributor to the POTW's Chloride exceedances." However, the correct entity is the Racine County Highway Department.

- The statement that "To date the POTW has been upgraded for the treatment of ammonia" is not correct.

Yorkville appreciates the opportunity to clarify the record in this matter.

Best regards,

STAFFORD ROSENBAUM LLP

Vanessa D. Wishart

Vanessa D. Wishart

VDW:mai

cc: Peter Hansen
Gary Hanson
Tim Pruitt
Bryan Hartsook

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0112181401

Appendix B

Racine DPW Chlorides Highway Department Garage Repair Assessment and Scoping

Fw: Racine Co Hwy Garage Repairs Assessment & Scoping
Gary Hanson to: Dan Schaefer 09/25/2018 09:48 AM

Dan here is the response from the county for Chlorides we should include in your Oct memo. Gary

----- Forwarded by Gary Hanson/seh on 09/25/2018 09:46 AM -----

From:	"Anderson, Julie" <Julie.Anderson@racinecounty.com>
To:	"ghanson@sehinc.com" <ghanson@sehinc.com>, "'rsanford@sehinc.com'" <rsanford@sehinc.com>
Cc:	"'tpruitt@peglawfirm.com'" <tpruitt@peglawfirm.com>, "'ajharrin@gklaw.com'" <ajharrin@gklaw.com>, "Plunkett, Nathan" <Nathan.Plunkett@racinecounty.com>
Date:	09/21/2018 10:30 AM
Subject:	FW: Racine Co Hwy Garage Repairs Assessment & Scoping

Gentlemen:

Pursuant to our meeting and discussion earlier this week, please see the attached scope of work proposed by Barrientos Design and Consulting. This proposal is primarily focused on the repairs to the Ives Grove garage but it also will address designs for managing the chloride runoff from this site that is affecting the Yorkville treatment plant.

The plan is to have a design prepared, and then obtain budget approval for a project in either 2019 or 2020.

I trust this proposal will assist you with your response to the DNR. We are going to accept the proposal and enter into a professional services contract with Barrientos yet in 2018 to begin the study, at a cost of nearly $15,000. This should be evidence of Racine County's commitment to work towards a solution to reduce the chloride exceedance at the Yorkville plant.

If you have further questions, please let me know.

Warmest regards,

Julie A. Anderson, Director
Public Works & Development Services
14200 Washington Ave, Sturtevant, WI 53177
262.886.8440

Racine DPW Hwy Dept Garage Repair Assessment & Scoping R1.pdf

BARRIENTOS
design & consulting

September 21, 2018

Mr. Nathan Plunkett
County Engineer
Racine County Department of Public Works & Development Services
14200 Washington Avenue
Sturtevant, WI 53177-1253

RE: HIGHWAY DEPARTMENT GARAGE REPAIRS DESIGN IMPLEMENTATION
Proposal of Architectural and Engineering Design Services R1

Dear Nathan,

In following with our site visit last week, Barrientos Design & Consulting, Inc. is providing you with this proposal for scoping the design effort for the recommended repairs specified in the Inspec report for the Ives Grove Highway Garage.

BACKGROUND

In November of 2016, Inspec engineers analyzed the structural and mechanical condition of the Highway Garage and recommended a series of repairs over a ten year period. In brief, these repairs involve:

1. Precast concrete beam and double tee repairs
2. HVAC replacements; MAU, ventilation, heating, gas detection and controls
3. Wall vapor transmission improvements
4. Overhead doors
5. New roofing membrane, insulation and drainage
6. New garage floor slabs
7. Replace skylights
8. Knee-wall repairs and masonry veneer repairs

In addition, there is the problem of high chloride content in the Yorkville Sewer Treatment system, and the County garage is a suspected source chloride runoff.

The County of Racine would now like implement these repairs and the reduction of chloride, in two-phase: the first one being budgeted for $195,000 and the second for $295,000. The first phase encompasses the immediate recommended repairs and the second phase encompasses the recommended repairs for years 2-30.

SCOPE OF WORK

Being that the Inspec recommendations will be converted into design and construction documents for bidding in the next year, the County would now like an initial design assessment, scoping of design services and cost estimate for implementing the work.

Barrientos Design, along with its consultant, Harwood Engineering, will provide architectural, structural and mechanical assessment, estimating and scoping services as follows:

BARRIENTOS
design & consulting

1. Walk-through the Garage with architects, structural engineers and HVAC engineers to review the recommended repairs. Includes review of the slabs, columns, beams, knee wall, masonry, roofing, drainage, overhead doors and HVAC equipment.
2. Create a simplified, to-scale, building floor plan and elevations based on the original drawing set.
3. Determine if any additional deterioration has occurred in these subject areas.
4. Determine if any code issues will be triggered by the building repairs, specifically architectural, structural and mechanical code items.
5. Provide opinion on Inspec's recommendations and if need be, develop alternate repair solutions.
6. Review sources and drainage patterns chloride generated in the Garage and Yard stormwater collection system.
7. Develop options for a chloride treatment/reduction strategy for the Garage stormwater drainage system.
8. Identify any additional building systems that may be impacted by the recommended repairs.
9. Update the repair program and provide a technical narrative describing the scope of work involved.
10. Notate the scope of repair work on the building plans and elevations. Show extent and location of the work required.
11. Develop a cost estimate for the recommended repairs
12. Provide a detailed scope of design work that outlines the required design work, activities, phases, deliverables and schedule to be undertaken by the final design consultant. This will be suitable for an eventual RFP or design contract.
13. Provide an estimate of design services fees by discipline and phase for each of the two work Packages.
14. Meet with Racine County staff twice: once to review the progress of the assessment and second, to review the final assessment and scope recommendations.
15. Submit the assessment and scoping document in a bound report. We will provide five copies and an electronic file.

SCHEDULE

Barrientos Design will provide these services over the course of 3 weeks

FEE

Barrientos Design & Consulting will provide the above assessment and design scoping for a lump sum fee of $14,892. This fee includes our consultant's work, travel and reproduction.

Terms and conditions of this Agreement will follow those in the attached Exhibit 1, Standards Terms and Conditions, of Racine County.

Thanks for this opportunity to assist in the Garage's improvements and we look forward to working with the County on this essential project.

Sincerely,

BARRIENTOS DESIGN & CONSULTING, INC.

Norman Barrientos

Norman Barrientos, AIA, President

ACCEPTED, RACINE COUNTY PUBLIC WORKS DEPARTMENT

Julie Anderson, Public Works Director　　　　　　Date

EXHIBIT 1
STANDARD TERMS AND CONDITIONS
FOR PROFESSIONAL SERVICES CONTRACT

These terms and conditions shall be incorporated into and made a part of all Professional Services contracts entered into between Racine County (hereinafter "the County") and the consultant/contractor/provider (hereinafter "COMPANY NAME"), references to both the County and COMPANY NAME are hereinafter "the parties." These terms and conditions shall take precedence and supersede any other terms and conditions which are not consistent with these terms and conditions.

1. **PERFORMANCE:** COMPANY NAME shall perform all services under this contract in a manner reflecting the standards within the industry.

2. **INTELLECTUAL PROPERTY:** Any documents or work product produced pursuant to this contract shall become the property of the County and shall be under the control of the County. COMPANY NAME shall be allowed to retain copies of said documents and work product.

3. **OWNERSHIP RIGHTS:** Any of the County's documents which are provided to COMPANY NAME to assist COMPANY NAME in the performance of his or her work shall be returned to the County upon demand of the County or at the conclusion of the project, whichever comes first.

4. **ASSIGNMENT:** COMPANY NAME shall not assign, sublet, subcontract or transfer any of the services or interest under the contract without the prior written consent of the County.

5. **EQUAL OPPORTUNITY:** In connection with the performance of services under this contract, COMPANY NAME agrees not to discriminate against any employee, applicant for employment or person receiving services from COMPANY NAME, pursuant to this contract because of age, race, religion, color, handicap, sex, physical condition, developmental disability, sexual orientation, natural origin as those terms are described in state and federal law.

6. **STATUTORY COMPLIANCE:** COMPANY NAME shall comply with all federal, state, local laws and regulations and requirements.

7. **INDEMNIFICATION:** Within the limits of insurance, COMPANY NAME shall indemnify, hold harmless, the County and its officers, agents and employees from any and all claims, damages to person or property, lawsuits or liability (including but not limited to reasonable fees and charges of COMPANY NAMEs, architects, attorneys, and other professionals, and reasonable court costs) resulting from the negligent acts, errors or omissions of COMPANY NAME or any of COMPANY NAME's agents or employees in the performance of services under this contract.

   To the fullest extent permitted by law, the County shall indemnify and hold harmless COMPANY NAME and its officers, agents and employees from any and all claims, damages to person or property, lawsuits or liability (including but not limited to reasonable fees and charges of COMPANY NAMEs, architects, attorneys, and other professionals, and reasonable court costs) resulting from the negligent acts, errors or omissions of Racine County or any of the County's agents, or employees in the performance of services under this contract.

8. **CHOICE OF LAWS:** The laws of the State of Wisconsin shall govern this contract, the construction, interpretation and determination of the rights and duties of the parties under this contract.

9. **INDEPENDENT CONTRACTOR:** COMPANY NAME shall be considered an independent contractor and not an employee of the County. The County agrees that COMPANY NAME shall have

sole control of the method, hours, work and time and manner of performance of this contract unless specifically stated. The County takes no responsibility for the selection, dismissal, supervision, direction or performance of COMPANY NAME's employees. Nothing contained in this contract shall create a contractual relationship with or cause of action in favor of a third party against either the County or COMPANY NAME. COMPANY NAME's services under this contract are being performed solely for the County's benefit, and no other entity shall have any claim against COMPANY NAME because of this contract or the performance or nonperformance of services provided hereunder.

10. **TERMINATION:** Either party may at any time, upon seven (7) days prior written notice to the other party, terminate this contract. The County shall pay for any and all work performed up to the termination date. The County shall not pay any termination expenses or costs if the contract is terminated regardless of the reason for termination.

11. **INSURANCE:** COMPANY NAME will maintain insurance coverage for Workers' Compensation, General Liability, and Automobile Liability and will provide certificates of insurance to the County upon request. Racine County shall be named as an additional insured by COMPANY NAME.

12. **ACCESS:** The County shall arrange for safe access to and make all provisions for COMPANY NAME and COMPANY NAME's agents and employees to enter upon public and private property as required for COMPANY NAME to perform services under this contract.

13. **SCHEDULE:** COMPANY NAME will meet their indicated milestone benchmark dates provided and incorporated into the contract. If unable to perform, COMPANY NAME will notify County representative, in writing, a minimum of ten (10) calendar days prior to the relevant benchmark date explaining, in detail, reasons for non-compliance. Racine County will review provided documentation and determine solution.

14. **COMPLETENESS OF DOCUMENTS:** COMPANY NAME will be solely responsible for understanding County's intent and the accuracy, clarity, and quality of all documentation. Racine County will not be expected to appraise, or be held responsible for, completeness or detailed review of design plans and specifications to detect errors or deficiencies in verbiage, intent, or actual design.

Racine County expressly rejects any of the following terms and conditions in its contracts for professional services:

1. **ARBITRATION:** There shall be no binding arbitration provisions in any contract between the County and COMPANY NAME.

2. **LIMIT OF LIABILITY:** COMPANY NAME's liability shall be within limits of insurance as part of the contract between the County and COMPANY NAME.

3. **ATTORNEY'S COSTS/FEES:** There shall be no provisions mandating the payment of the either of other party's attorney's fees which are the result of litigation arising out of contract disputes.

ENTIRE AGREEMENT: THIS AGREEMENT CONSTITUTES THE ENTIRE UNDERSTANDING BETWEEN COMPANY NAME AND THE COUNTY. ANY AMENDMENTS TO THIS AGREEMENT SHALL BE IN WRITING AND EXECUTED BY BOTH PARTIES.

END OF DOCUMENT

INITIALS: ______

______

Appendix C

Yorkville WQBEL Memo

CORRESPONDENCE/MEMORANDUM

DATE: July 18, 2018

TO: Bryan Hartsook - Milwaukee

FROM: Nick Lent - Milwaukee

SUBJECT: Water Quality-Based Effluent Limitations for the Yorkville Sewer Utility District No 1 - WPDES Permit No. WI-00289831-09-0 (FID 252003290)

This is in response to your request for an evaluation of the need for water quality-based effluent limitations using Chapters NR 102, 104, 105, 106, 205, 207, 210 and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Yorkville Sewer Utility District No 1 in Racine County. This municipal wastewater treatment facility discharges to Ives Grove Ditch, a tributary to Hoods Creek located in the Root River Watershed in the Root/Pike River Basin, Racine County. The evaluation of the permit recommendations is discussed in more detail in the attached report.

No changes are recommended in permit limitations for BOD_5, TSS, pH, or dissolved oxygen. Based on our review, the following recommendations are made on a chemical-specific basis:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
BOD_5			30 mg/L	20 mg/L		
TSS			30 mg/L	20 mg/L		
pH	9.0 s.u.	6.0 s.u.				
Dissolved Oxygen		4.0 mg/L				
Ammonia Nitrogen November – April May – October	 pH-variable pH-variable		 **29 mg/L** 5.1 mg/L	 **12.4 mg/L** 2.2 mg/L		 1, 2
Phosphorus Interim limit s. 217.13 WQBEL				 0.8 mg/L 0.225 mg/L	 0.075 mg/L 0.094 lbs/day	 3
Chloride	760 mg/L 950 lbs/day		400 mg/L 490 lbs/day	**400 mg/L**		2, 4
Zinc, total recoverable						5
Acute WET						6
Chronic WET						6

Footnotes:

1. Daily maximum ammonia nitrogen effluent limitations based upon the complete range of potential effluent pH (6.0 – 9.0 s.u.) are recommended instead of a single daily maximum effluent limit based upon the maximum expected effluent pH. The pH-variable effluent ammonia nitrogen limits are summarized in the following table:

Effluent pH (s.u.)	NH_3-N Limit (mg/L)	Effluent pH (s.u.)	NH_3-N Limit (mg/L)	Effluent pH (s.u.)	NH_3-N Limit (mg/L)
6.0 < pH ≤ 6.1	55	7.0 < pH ≤ 7.1	36	8.0 < pH ≤ 8.1	8.4
6.1 < pH ≤ 6.2	54	7.1 < pH ≤ 7.2	33	8.1 < pH ≤ 8.2	6.9
6.2 < pH ≤ 6.3	53	7.2 < pH ≤ 7.3	30	8.2 < pH ≤ 8.3	5.7
6.3 < pH ≤ 6.4	52	7.3 < pH ≤ 7.4	26	8.3 < pH ≤ 8.4	4.7
6.4 < pH ≤ 6.5	51	7.4 < pH ≤ 7.5	23	8.4 < pH ≤ 8.5	3.9
6.5 < pH ≤ 6.6	49	7.5 < pH ≤ 7.6	20	8.5 < pH ≤ 8.6	3.2
6.6 < pH ≤ 6.7	47	7.6 < pH ≤ 7.7	17	8.6 < pH ≤ 8.7	2.7
6.7 < pH ≤ 6.8	45	7.7 < pH ≤ 7.8	14	8.7 < pH ≤ 8.8	2.2
6.8 < pH ≤ 6.9	42	7.8 < pH ≤ 7.9	12	8.8 < pH ≤ 8.9	1.8
6.9 < pH ≤ 7.0	39	7.9 < pH ≤ 8.0	10	8.9 < pH ≤ 9.0	1.6

2. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code, are included in bold. See Part 7 Expression of Limits of the attachment for more information about the changes in the weekly average limits.
3. This monthly average interim limit should apply for the entire length of the reissued permit term, because the multi-discharger variance (MDV) application that was submitted has been approved by the Department. See Part 4 of the attached memo for more information.
4. These are the water quality-based effluent limitations for chloride. An alternative effluent limitation of 1400 mg/L as a year-round daily maximum and 710 mg/L as a weekly average from December – April and 450 mg/L from May – November may be included in the permit in place of these limits if the chloride variance application that was submitted is approved by EPA.

5. Monitoring only, at a frequency of once per month in the fourth year or the reissued permit.

6. Along with the chemical-specific recommendations mentioned above, the need for acute and chronic whole effluent toxicity (WET) monitoring and limits has also been evaluated for the discharge from Yorkville WWTF. Accordingly**, three acute and chronic WET tests are recommended in the reissued permit.** Sampling WET concurrently with chloride is recommended. Tests should be done in rotating quarters, in order to collect seasonal information about this discharge.

   Acute testing shall be performed using a dilution series of 100 %, 50 %, 25 %, 12.5 %, and 6.25 %. A synthetic (standard) laboratory control water may be used as the control and dilution water for acute WET tests. Chronic testing shall be performed using a dilution series of 100 %, 30 %, 10 %, 3 % & 1 %. The Instream Waste Concentration to assess chronic test results is 9 %. The primary control and dilution water used in chronic WET tests conducted on Outfall 001 shall be a grab sample collected from the Root River, upstream of the mouth of Hoods Creek.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Nick Lent at (414) 263-8623 or Nicholas.Lent@wisconsin.gov.

Attachments:
1. Water Quality-Based Effluent Limits Memo: Yorkville Sewer Utility District No. 1
2. Site Map – Yorkville Sewer Utility District No. 1

PREPARED BY: Nick Lent – Water Resources Engineer, Effluent Limits Calculator

E-cc: Diane Figiel, P.E. - WY/3
Geisa Thielen - Milwaukee

Attachment #1

Water Quality-Based Effluent Limitations for
Yorkville Sewer Utility District No 1
WPDES Permit No. WI-0028291-10

Prepared by: Nick Lent

PART 1 – BACKGROUND INFORMATION

Facility Description: The Yorkville Sewer Utility District No 1 ("Yorkville") operates a 0.150 million gallon per day (MGD) annual average design flow wastewater treatment facility (WWTF) servicing an approximate population of 1,000. There are no significant industrial users in the service area, but the utility district does monitor local businesses and industry through local sewer use ordinance authority. The WWTF operates as an activated sludge treatment process consisting of one influent pump station, a fine bar screen, and a combination aeration basin/travelling bridge final clarifier with chemical addition for phosphorus removal. Waste activated sludge is aerobically digested before being hauled offsite for disposal by PATS Sanitary Service (WPDES Permit No. WI-0036111-06). Effluent is discharged to a drain tile that flows approximately one mile east-northeast and outlets on the east side of HWY V.

Disinfection of the effluent is not required based on the conditions of s. NR 210.06(3), Wis. Adm. Code. Recreational use standards for the state may be revised in the future based on updated EPA requirements. This potential rule change could require disinfection of the effluent at that time.

Existing Permit Limitations: The current permit expired on March 31, 2018, and includes the following effluent limitations.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six Month Average	Footnotes
BOD_5			30 mg/L	20 mg/L		1
TSS			30 mg/L	20 mg/L		1
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				1
Ammonia Nitrogen November – April	11.4 mg/L		31 mg/L	12.4 mg/L		
Phosphorus, Total Interim limit s. 217.13 WQBEL				8.2 mg/L 0.225 mg/L	0.075 mg/L 0.094 lbs/day	
Chloride December – April May – November			710 mg/L 450 mg/L			2
Zinc, Total Recoverable	689 µg/L 2.6 lbs/day		345 µg/L 0.43 lbs/day (dry) 0.7 lbs/day (wet)			
Chronic WET						3

Attachment #1

Footnotes:

1. These limitations are not being evaluated as part of this review. Because the water quality criteria, reference effluent flow rates, and receiving water characteristics have not changed significantly, limitations for these water quality characteristics do not need to be re-evaluated now
2. This is a US EPA approved interim chloride limit. The weekly average WQBEL is 400 mg/L.
3. Three chronic WET tests are included, with an instream waste concentration of 100 %.

As noted in the previous WQBEL memos for this facility; In the event that Ives Road Ditch or Hoods Creek is reclassified to a full fish and aquatic life stream, or if future studies indicate a potential for impact to downstream reaches, these limits are subject to change.

Receiving Water Information:

- Name: Ives Grove Ditch (WBIC 3300)
- Classification: Limited Aquatic Life from the outfall to Hoods Creek (about 1.1 miles from the discharge to the confluence with Hoods Creek).
  Limited Forage Fishery from Hoods Creek to the Root River, approximately 8 miles from the outfall location. Current limits for toxic substances and total phosphorus are based on the protection of the Limited Forage Fishery classification beginning at confluence with Hoods Creek. In the future, the Department intends to update the ch. NR 104, Wis. Adm. Code, and these classifications may then be subject to revision, based upon a formal designated use analyses of the immediate and downstream waters.
- Low Flow: 0 cfs for Ives Grove Ditch and Hoods Creek. Discharge is to headwaters portion of Ives Road Ditch. Further downstream, at the first non-variance water, the 7-Q_{10} of the Root River is 2.4 cfs, based on a December 2014 letter from Rob Waschbusch - USGS. This value is used for determination of the instream waste concentration (IWC) for reference in chronic WET testing.
- Hardness = 374 mg/L as $CaCO_3$. Effluent hardness was used since the receiving water is effluent dominated in low-flow conditions.
- % of low flow used to calculate limits: 25%, but no background low flow
- Source of background concentration data: Background concentrations are not included since they do not influence the calculated WQBEL when the receiving water low flows are equal to zero cfs.
- Multiple dischargers: No other point source dischargers in the immediate area.
- Impaired water status: The immediate receiving waters are not listed for any impairments, however, approximately 8 miles downstream from the discharge, the Root River is listed as impaired for elevated total phosphorus.

Effluent Information:

- Design Flow Rate(s):
  Annual average = 0.150 MGD (Million Gallons per Day)
  Peak daily = 0.445 MGD
  Peak weekly = 0.244 MGD
  Peak monthly = 0.221 MGD
  (note – these peak flows were previously estimated using effluent data from 2001 through 2003, and are only needed for setting mass limits for discharges of toxic substances. If WQBELs go into effect in absence of a variance, these values should be reevaluated)
  For reference, the actual average flow from April 2013 through March 2018 was 0.08 MGD.
- Hardness = 374 mg/L as CaCO3. This value represents the geometric mean of data from permit

application, four effluent samples taken between 4/2/17 and 4/14/17

- Acute dilution factor used: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Effluent characterization: This facility is categorized as a minor municipality so the permit application required effluent sample analyses for a limited number of common pollutants, primarily metal substances plus ammonia, chloride, hardness and phosphorus. Effluent data available from the permit application and all other permit-required monitoring from April 2013 through March 2018 is used in this evaluation. Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.".

	Chloride – mg/L	Zinc - µg/L
1-day P_{99}	1361	118.5
4-day P_{99}	960	70.1
30-day P_{99}	750	38.93
Mean	646	34.14
Standard Deviation	230	25.17
Sample size	240	69
Range	114 - 1513	<0 - 177

Sample Date	Cu - µg/L	Sample Date	Cu - µg/L	Sample Date	Cu - µg/L
04/02/2017	7.4	04/18/2017	<6.3	05/04/2017	<6.3
04/06/2017	12	04/22/2017	8.8	05/08/2017	<6.3
04/10/2017	<6.3	04/26/2017	10.4	05/12/2017	11.6
04/14/2017	<6.3	04/30/2017	<6.3		
Mean = 4.56 µg/L					

For informational purposes and to meet the requirements in s. NR 201.03(6), Wis. Adm. Code, the following table illustrates the average concentrations at Outfall 001 from April 2013 through March 2018 for all parameters with limits in the current permit, or recommended as a part of this memo:

	Average	Average Mass
BOD_5	8.58 mg/L*	5.72 lbs/day
TSS	8.73 mg/L	5.82 lbs/day
pH field	7.93 s.u.	N/A
Dissolved Oxygen	9.99 mg/L	6.67 lbs/day
Phosphorus	2.04 mg/L*	1.36 lbs/day
Ammonia Nitrogen	2.40 mg/L*	1.60 lbs/day
Chloride	646 mg/L	431 lbs/day

*Results below the method detection limit (also known as the level of detection, or LOD) were included as zeroes in calculation of average.

- Water Source: Groundwater. Municipal public well supply with 900 gpm pumping capacity. Maximum reservoir storage in elevated tank is 750,000 gallons. Serviced by Yorkville Water Utility.
- Additives: SorbX is used for phosphorus removal at the WWTF.

Attachment #1

PART 2 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR TOXIC SUBSTANCES – EXCEPT AMMONIA NITROGEN

In general, permit limits for toxic substances are recommended whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P_{99}) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q_{10}

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Adm. Code (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q_{10} receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards.

$$\text{Limitation} = \frac{(WQC)\,(Qs + (1-f)\,Qe) - (Qs - f\,Qe)\,(Cs)}{Qe}$$

Where:

WQC =Acute toxicity criterion or secondary acute value according to ch. NR 105
Qs = average minimum 1-day flow which occurs once in 10 years (1-day Q_{10})
if the 1-day Q_{10} flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q_{10}).
Qe = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d)
f = Fraction of the effluent flow that is withdrawn from the receiving water, and
Cs = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e).

As a rule of thumb, if the receiving water is effluent dominated under low stream flow conditions, the 1-Q_{10} method of limit calculation probably produces the most stringent daily maximum limitations, and should be used while making reasonable potential determinations. This is the case for Yorkville.

The following tables list the water quality-based effluent limitations for this discharge along with the results of effluent sampling for all the detected substances. All concentrations are expressed in term of micrograms per Liter (µg/L), except for hardness and chloride (mg/L).

Attachment #1

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0.0 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})).

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Arsenic		340		340	68.0	<8.3		
Cadmium	374	46.8		46.8	9.4	<1.3		
Chromium (+3)	301	4446		4446	889	<2.5		
Copper	374	53.9		53.9	10.78	4.56		
Lead	356	365		365	72.9	<4.3		
Nickel	268	1080		1080	216	<2.6		
Zinc	333	345		345			118.5	177
Chloride - mg/L		757		757			1361	1513

* The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105 over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

* * Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q_{10} flow rates yields a more restrictive limit than the 2 x ATC method of limit calculation.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0.0 cfs (¼ of the 7-Q_{10})

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Arsenic		152.2		152	30.4	<8.3	
Cadmium	175	3.82		3.82	0.8	<1.3	
Chromium (+3)	301	325.75		326	65.2	<2.5	
Copper	374	32.00		32.0	6.4	4.56	
Lead	356	95.51		95.5	19.1	<4.3	
Nickel	268	120.18		120	24.0	<2.6	
Zinc	333	344.68		345			70.1
Chloride - mg/L		395		395			603.39

* The indicated hardness may differ from the receiving water hardness because the receiving water hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the chronic criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

Monthly Average Limits based on Wildlife Criteria (WC):

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Attachment #1

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 0.0 cfs (¼ of the Harmonic Mean)

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Cadmium	370		370	74	<1.3	
Chromium (+3)	3818000		3818000	763600	<2.5	
Lead	140		140	28	<4.3	
Nickel	43000		43000	8600	<2.6	

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 0.0 cfs (¼ of the Harmonic Mean)

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		13.3	2.66	<8.3

There were no detected substances in the effluent for which Human Cancer Criteria exists, therefore, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Conclusions and Recommendations: Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are needed for Chloride.

Yorkville Sewer Utility District No 1 is not currently required to disinfect, so chlorine is not evaluated as part of the effluent limits summary.

Chloride **–** Considering available effluent data from the current permit term (April 2013 – March 2018) the 1-day P_{99} chloride concentration is 1361 mg/L, and the 4-day P_{99} of effluent data is 960 mg/L.

Because the 1-day P_{99} exceeds the calculated daily maximum WQBEL, a daily maximum effluent limit is needed in accordance with s. NR 106.05(4)(b) Wis. Adm. Code.

Because the 4-day P_{99} exceeds the calculated weekly average WQBEL, a weekly average effluent limit is needed in accordance with s. NR 106.05(4)(b) Wis. Adm. Code.

However, Subchapter VII of ch. NR 106 provides for a variance from water quality standards for this substance, and Yorkville has requested such a variance. That variance may be granted subject to the following conditions:

1) The permit shall include an “Interim” limitation intended to prevent an increase in the discharge of Chloride;
2) The permit shall specify “Source Reduction Measures” to be implemented during the permit term, with periodic progress reports; and
3) The permit shall include a “Target Value” to gage the effectiveness of the Source Reduction Measures, and progress toward the water quality-based effluent limitations.

Attachment #1

Interim limit for Chloride;

Section NR 106.82 (4), Wis. Adm. Code defines a “Daily maximum interim limitation” as either the 1-day P_{99} or 105 % of the permittees highest representative effluent datum. Section NR 106.82 (9), Wis. Adm. Code defines a “Weekly average interim limitation” as either the 4-day P_{99} or 105 % of the highest weekly average concentration of the representative data. The following table shows the 1 and 4-day P_{99} effluent chloride concentrations listed in the 2013 WQBEL memo and those from the existing permit.

	January 2005 – July 2012		April 2013 – March 2018		
	May - November	December - April	May - November	December - April	Year Round
1-day P_{99}	606 mg/L	1283 mg/L	807 mg/L	1566 mg/L	1361 mg/L
1-day P_{99}	449 mg/L	684 mg/L	654 mg/L	1151 mg/L	960 mg/L

The current permit includes an interim limit of 710 mg/L as a weekly average from December – April and 450 mg/L from May – November which is based on available data from the previous permit term. Ideally, effluent concentrations would be trending down to show progress towards meeting the calculated WQBELs. However, in this case effluent concentrations have increased during the existing permit term, and the increased monitoring frequency has captured higher effluent variability of chloride concentrations, both of which has driven the P_{99} calculations higher in the existing permit term.

Although the P_{99}’s of recent effluent data is higher than the current interim limits, the Department does not find it appropriate to increase the interim concentration limit in the reissued permit, since it would be counterproductive to meeting the final WQBEL. Therefore, no changes from **the current weekly average interim chloride limits of 710 mg/L for December through April and 450 mg/L for May through November are recommended for permit reissuance. Addition of a year-round daily maximum interim limit of 1400 mg/L, equal to the 1-day P_{99} rounded to two significant figures, is also recommended for permit reissuance if the variance is approved by EPA.**

A target value and permit language for Source Reduction Measures are not recommended as part of this evaluation. These should follow contact with Yorkville. Though if the Department and Yorkville are unable to reach agreement on all the terms of a Chloride Variance, the calculated limits described earlier should be included in the permit, in accordance with s. NR 106.83(3), Wis. Adm. Code.

Chloride monitoring recommendations: Four samples per month (on consecutive days) are recommended. This allows for better averaging of the results to compare with the weekly average interim limit, and allows the use of the average in determining future interim limits, and degree of success with chloride reduction measures.

In the absence of a variance, Yorkville would be subject to the water quality-based effluent limits of 760 mg/L and 950 lbs/day (757 mg/L × 0.15 MGD × 8.34) as a daily maximum, and 400 mg/L and 500 lbs/day (395 mg/L × 0.15 MGD × 8.34) as a weekly average; and alternative wet weather mass limits.

<u>Mercury</u> – Because Yorkville is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code, the permit application did not require effluent monitoring for mercury. In accordance with s. NR 106.145(3)(a)3., Wis. Adm. Code, a minor municipal discharger shall monitor and report results of influent and effluent mercury monitoring once every three months if, “there are two or more exceedances

in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5), Wis. Adm. Code." A review of the past five years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from annual sampling during the last permit term was 0.0526 mg/kg, with a maximum reported concentration of 0.263 mg/kg. Therefore, no additional effluent mercury monitoring is recommended for permit reissuance.

Zinc – The current permit includes monitoring and a daily maximum limit for zinc. The facility has collected 69 data points over the last five years. The 1-day P_{99} and maximum effluent concentration are below the daily maximum limit. Because the facility has not implemented a specific treatment method to remove zinc, and effluent concentrations are now less than the daily maximum water quality based effluent limit, so **no limit is necessary for permit reissuance. Effluent monitoring once per month in the fourth year of the permit is recommended to provide enough data for a representative P_{99} calculation to be used in the next WQBEL evaluation.**

PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has daily maximum, weekly average and monthly average limits for Outfall 001 (calculated in 2005 and 2013). These limits are re-evaluated at this time due to the following changes:

- The maximum expected effluent pH has increased considerably, from 8.2 to 8.4 s.u., and
- Updates to subchapter IV of ch. NR 106, Wis. Adm. Code which allows limits based on available dilution (none) instead of limits set to twice the acute criteria.

For informational purposes, the existing permit includes a daily maximum limit of 11.4 mg/L, weekly average of 31 mg/L, and monthly average of 12.4 mg/L from November - April. There are currently no ammonia limits during the warmer months of May – October.

Daily Maximum Limit Calculation: Daily maximum (acute) limitations are based on acute toxicity criteria, which are a function of the effluent pH and the receiving water classification. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation.

$$\text{ATC in mg/L} = [A \div (1 + 10^{(7.204 - pH)})] + [B \div (1 + 10^{(pH - 7.204)})]$$

Where: A = 0.411 and B = 58.4 for a Warmwater Sport fishery, and
A = 0.411 and B = 58.4 for a Limited Forage Fishery, and
A = 0.633 and B = 90.0 for Limited Aquatic Life, and

pH (s.u.) = maximum reasonably expected pH of the effluent

The current daily maximum limit of 11.4 mg/L was based on an effluent pH of 8.20 as a 99th upper percentile value from the previous permit term. The March 11, 2013 WQBEL memo states this limit is based upon downstream protection of Hoods Creek, which has a limited forage fish classification. Ives Grove Ditch only runs a relatively short distance to the confluence with Hoods Creek.

Attachment #1

Prior to September 2016, the daily maximum limit was calculated by multiplying the calculated ATC by two. Updates to subchapter IV of ch. NR 106, Wis. Adm. Code outline the option for the Department to implement use of the 1-Q_{10} receiving water low flow in order to calculate daily maximum limits if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. In other words, a more restrictive effluent limitation may be necessary if the receiving water is effluent dominated for a period after mixing with the discharge. This is the case for the discharge from Yorkville to Ives Road Ditch, because the low flow is zero cfs.

The daily maximum effluent limit using the 1-Q_{10} flow is equal to the acute criteria. Some considerations may be appropriate to determine if the more restrictive daily maximum limits are warranted. These may include what other ammonia limits are in the permit (i.e. are more restrictive chronic limits in place), how well the facility has been removing ammonia, and water quality data in the department SWIMS database that shows water quality problems with ammonia nitrogen near or downstream from the outfall.

For Yorkville, the daily maximum limits are generally more restrictive than the weekly or monthly average due to the upper range of effluent pH tendencies, and the facility has issues maintaining nitrification year-round. These two situations suggest that daily maximum limits using 1-Q_{10} flows are appropriate, even without site specific information showing water quality problems with ammonia nitrogen exist near or downstream from the discharge. In review of effluent pH data from the current permit term (n =1826), the maximum report value was 9.89 s.u., and a pH of greater than 8.4 was reported 19 times. The upper 99th percentile of data was 8.41 s.u. A value of 8.41 is believed to represent the maximum reasonably expected effluent pH, and therefore most appropriate for determining a single daily maximum limit for ammonia nitrogen. Substituting a value of 8.41 into the equation above for Limited Forage Fishery classifications yields an ATC = 3.9 mg/L, which is the calculated daily maximum limit using the maximum reasonably expected pH of the effluent. This potential adjustment marks a significant change from the existing permit limitation, therefore, it should be noted that the daily maximum limit in the permit could instead be based on the same day's reported effluent pH. Therefore, **use of the following table is recommended for permit reissuance in lieu of a single daily maximum ammonia nitrogen limit.**

pH-variable daily maximum ammonia nitrogen effluent limitations - LFF

Effluent pH s.u.	**NH_3-N Limit mg/L**	**Effluent pH s.u.**	**NH_3-N Limit mg/L**	**Effluent pH s.u.**	**NH_3-N Limit mg/L**
6.0 < pH ≤ 6.1	55	7.0 < pH ≤ 7.1	36	8.0 < pH ≤ 8.1	8.4
6.1 < pH ≤ 6.2	54	7.1 < pH ≤ 7.2	33	8.1 < pH ≤ 8.2	6.9
6.2 < pH ≤ 6.3	53	7.2 < pH ≤ 7.3	30	8.2 < pH ≤ 8.3	5.7
6.3 < pH ≤ 6.4	52	7.3 < pH ≤ 7.4	26	8.3 < pH ≤ 8.4	4.7
6.4 < pH ≤ 6.5	51	7.4 < pH ≤ 7.5	23	8.4 < pH ≤ 8.5	3.9
6.5 < pH ≤ 6.6	49	7.5 < pH ≤ 7.6	20	8.5 < pH ≤ 8.6	3.2
6.6 < pH ≤ 6.7	47	7.6 < pH ≤ 7.7	17	8.6 < pH ≤ 8.7	2.7
6.7 < pH ≤ 6.8	45	7.7 < pH ≤ 7.8	14	8.7 < pH ≤ 8.8	2.2
6.8 < pH ≤ 6.9	42	7.8 < pH ≤ 7.9	12	8.8 < pH ≤ 8.9	1.8
6.9 < pH ≤ 7.0	39	7.9 < pH ≤ 8.0	10	8.9 < pH ≤ 9.0	1.6

Attachment #1

Weekly and monthly average limits - Because there have been no changes in the effluent or receiving water flow rates, the calculated limits shown in the March 11, 2013 WQBEL have not changed (for the Hoods Creek LFF classification near the mouth of Ives Road Ditch. There is little in the way of dilution until further downstream in Hoods Creek, after confluence with several unnamed tributaries). The calculated limits are shown below for purposes of making a reasonable potential determination. Previously, it was determined that there was no reasonable potential to exceed the summer limits, so they are not included in the current permit. This determination is reevaluated below.

	Summer May - Oct	Winter Nov - Apr
Weekly Average	5.6 mg/L	31 mg/L
Monthly Average	2.2 mg/L	12.4 mg/L

Reasonable potential determination

The following table evaluates the statistics based upon ammonia data reported from April 2013 – March 2018 with those results being compared to the calculated limits to determine the need to include ammonia limits in the reissued permit for the months and averaging periods where there currently isn't a limit. That need is determined by calculating 99th upper percentile (or P_{99}) values for ammonia during each of the two periods of months and comparing the daily maximum values to the daily maximum limit.

Yorkville Sewer Utility District No 1 WWTF Ammonia Nitrogen Statistical Evaluation, April 2013 through March 2018 (mg/L)

	May – October	November - April
1-day P_{99}	15.17	26.99
4-day P_{99}	10.34	14.75
30-day P_{99}	4.51	6.92
Mean	1.17	3.75
Standard deviation	5.51	6.08
Sample size & # of non-detects	222 & 49	203 & 24
Range	< 0.01 - 36.4	< 0.01 - 27.1

The 1-day P_{99} exceeds the calculated daily maximum limit based upon effluent pH at the facility. The 4-day and 30-day P_{99} concentrations also exceed the calculated weekly and monthly limits for the summer months, so **there is reasonable potential for the discharge to exceed the calculated daily, weekly, and monthly average limits, and they are recommended for permit reissuance.** Retention of the existing weekly and monthly average limits for the winter months is required regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code. A review of effluent limit expression requirements consistent with s. NR 106.07, Wis. Adm. Code, is provided at the end of this memo (Part 7).

PART 4 –PHOSPHORUS

Technology Based Limit (TBL)

Wisconsin Administrative Code, ch. NR 217, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of total phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit. Yorkville has not previously exceeded this threshold and does not have a TBL. A review of effluent total phosphorus data is shown below, and suggests that Yorkville is well below the 150 lb/month threshold.

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (million gallons/month)	Calculated Mass (lbs/month)
May 2014	5.41	2.32	104.7
June 2014	4.16	1.95	67.7
July 2014	3.79	1.83	57.8
August 2014	4.89	2.03	82.8
September 2014	4.72	2.30	90.5
October 2014	6.17	2.96	152.3
November 2014	8.36	1.82	126.9
December 2014	5.10	1.93	82.1
January 2015	3.74	1.79	55.8
February 2015	4.44	1.31	48.5
March 2015	3.85	2.02	64.9
April 2015	3.23	2.05	55.2
Average			**82.4**

Total P (lbs/month) = Monthly average (mg/L) x total flow (MGD) x 8.34 (lbs/gallon)
Where total flow is the sum of the actual (not design) flow (in MGD) for that month

No technology based limit is recommended for permit reissuance, however the need for water quality-based effluent limits must also be evaluated.

Water Quality-Based Effluent Limitations:
Based on the current administrative rules for phosphorus discharges, phosphorus criteria in s. NR 102.06, Wis. Adm. Code, do not apply to limited aquatic life waters [s. NR 102.06(6)(d), Wis. Adm. Code]. These waters were not included in the USGS/WDNR stream and river studies and, therefore, the Department lacked the technical basis to determine and propose applicable criteria. At some time in the future, the Department may adopt phosphorus criteria based on new studies focusing on limited aquatic life waters. The guidance (*Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges V 2.0)* suggests that during the interim, water quality-based effluent limitations should be based on the criteria and flow conditions for the next stream segment downstream (or downstream lake or reservoir, if appropriate). A downstream protection checklist has been completed in addition to the following review, and is saved in SWAMP permit documents.

Since Hoods Creek is classified as a limited forage fishery only 1.1 miles from the discharge, and phosphorus is a conservative pollutant, phosphorus limitations need to be considered for Yorkville. This determination is consistent with s. NR 217.12(1)(a), Wis. Adm. Code.

Section NR 102.06(3)(a), Wis. Adm. Code, specifically names reaches of rivers for which a phosphorus criterion of 0.1 mg/L applies. For other stream segments that are not specified in s. NR 102.06(3)(a), Wis. Adm. Code, s. NR 102.06(3)(b), Wis. Adm. Code, specifies a phosphorus criterion of 0.075 mg/L. Therefore, the phosphorus criterion of 0.075 mg/L is applicable starting at Ives Road Ditch confluence with Hoods Creek, which is classified as a Limited Forage Fishery.

The limit calculation formula is described in s. NR 217.13 (2)(a), Wis. Adm. Code, for phosphorus water quality based effluent limitations (WQBELs):

Limitation = [(WQC)(Qs+(1-f)Qe) – (Qs-fQe)(Cs)]/Qe

Where: WQC = Water Quality Criteria; 0.075 mg/L from Hoods Creek downstream
Qs = 100% of the 7-Q_2 (no specific downstream data available)
Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code
Qe = Effluent design flow rate = 0.15 MGD (0.225 cfs)
f = the fraction of effluent withdrawn from the receiving water = 0

The calculated WQBEL is equal to criteria because there is no appreciable background streamflow at 7-Q_2 flow conditions at the confluence with Hoods Creek (estimated to be $\leq$ 0.02 cfs).

Reasonable Potential Determination
Prior to the issuance of the last permit, there was no means of phosphorus treatment in place. The phosphorus concentrations ranged from 4-8 mg/L. Presently the discharge has averaged 0.5 – 1 mg/L. Since the 30-day P_{99} of reported effluent total phosphorus data is (still) above the calculated WQBEL, **the discharge has reasonable potential to cause or contribute to an exceedance of the water quality criterion.** Therefore, **a water quality-based effluent limit is recommended.**

Limit Expression
Because the calculated WQBEL is less than or equal to 0.3 mg/L, the effluent limit of 0.075 mg/L may be expressed as a six-month average. If a concentration limitation expressed as a six-month average is included in the permit, a monthly average concentration limitation of 0.225 mg/L, equal to three times the WQBEL calculated under s. NR 217.13, Wis. Adm. Code, shall also be included in the permit. The six-month average should be averaged during the months of May – October and November – April.

Mass Limits
Since the discharge is upstream from a surface water that is listed as impaired for total phosphorus (Root River) a mass limit is also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code. **This final mass limit shall be 0.094 lbs/day expressed as a six-month average (0.075 mg/L × 8.34 × 0.15 MGD).**

Multi-Discharge Variance Interim Limit
With the permit application, Yorkville has applied for the phosphorus multi-discharger variance (MDV). The application has been reviewed and approved by the Department. Conditions of the phosphorus MDV require the facility to comply with an interim phosphorus limit in lieu of meeting the final water quality based effluent limit for this permit term. The facility began chemical treatment for phosphorus removal within the present permit term. Phosphorus removal has greatly increased, but has not been entirely consistent. The recommended interim limit, pursuant to s. 283.16 (6) 1, Wis. Stats., is 0.8 mg/L as a

monthly average. A compliance schedule may be appropriate to meet this interim limit, but compliance with 0.8 mg/L monthly average interim limit shall be no later than the end of the reissued permit.

PART 5 –THERMAL

New surface water quality standards for temperature took effect on October 1, 2010. These new regulations are detailed in Chapters NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. The daily maximum effluent temperature limitation shall be 86 ˚F for discharges to surface waters classified as Limited Aquatic Life according to s. NR 104.02(3)(b)1, except for those classified as wastewater effluent channels and wetlands regulated under ch. NR 103 [s. NR 106.55(2), Wis. Adm. Code] which has a daily maximum effluent temperature limitation of 120 °F.

Reasonable Potential

The last available temperature data was collected in calendar year 2011. Based on the available discharge temperature data shown below, the maximum daily effluent temperature reported was 72.5 °F; therefore, no reasonable potential for exceeding the daily maximum limit exists, and **no limits are recommended at this time**. The available data is in line with the expected effluent temperature based upon facilities with more data which usually don't exceed 80 °F as a daily maximum, so **no additional effluent temperature monitoring is recommended for permit reissuance**. If the receiving stream is reclassified in the future, Yorkville may be subject to different temperature limits under the new classification.

Month	Representative Highest Monthly Effluent Temperature		**Calculated Effluent Limit**	
	Weekly Maximum (°F)	Daily Maximum (°F)	**Weekly Average Effluent Limitation** (°F)	**Daily Maximum Effluent Limitation** (°F)
JAN	49.8	50.5	-	86
FEB	48.8	51	-	86
MAR	50.0	51.1	-	86
APR	54.3	55.4	-	86
MAY	59.2	60.9	-	86
JUN	65.7	66.7	-	86
JUL	69.7	71.7	-	86
AUG	71.2	71.8	-	86
SEP	70.6	72.5	-	86
OCT	67.3	68.3	-	86
NOV	62.5	63.1	-	86
DEC	57.8	58.8	-	86

Attachment #1

PART 6 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. The following evaluation is based on procedures in the Department's WET Program Guidance Document (revision #11, dated November 1, 2016).

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. In order to assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50% of the test organisms) greater than 100% effluent.

- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. In order to assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC). The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 9 % shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm. Code:

  $$\text{IWC (as \%)} = Q_e \div \{(1 - f)Q_e + Q_s\} \times 100$$

  Where:

  Q_e = annual average flow = 0.15 MGD = 0.232 cfs
  f = fraction of the Q_e withdrawn from the receiving water = 0
  Q_s = 100% of the 7-Q_{10} at the first downstream non-variance waterbody (Root River) = 2.4 cfs
  (consistent with the WET Program Guidance Document (revision #11, dated November 1, 2016)

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (referenced in s. NR 219.04, Wis. Adm. Code), the default acute dilution series is: 100 %, 50 %, 25 %, 12.5 %, and 6.25 %, and the default chronic dilution series is 100 %, 30 %, 10 %, 3 % & 1 %. The permittee or Department staff may choose other dilution series, but alternate dilution series must be specified in the WPDES permit. For guidance on selecting an alternate dilution series, see Chapter 2.11 of the WET Guidance Document.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. In the case for Yorkville, the Root River is the first downstream non-variance water, and therefore should be used as the dilution water and primary control in Chronic WET tests.

Attachment #1

- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data. Data which is not believed to be representative of the discharge is not included in reasonable potential calculations. The following table differentiates between tests used and not used when making WET determinations.

WET Data History

Date Initiated	Chronic Results IC_{25} %				Footnotes or Comments
	C. dubia	Fathead Minnow	Pass or Fail?	Use in RP?	
10/20/2005	>100	>100	Pass	Yes	
06/08/2006	>100	>100	Pass	Yes	
07/12/2007	>100	>100	Pass	Yes	
05/20/2014	>100	>100	Pass	Yes	
07/14/2015	>100	>100	Pass	Yes	
10/04/2016	>100	>100	Pass	Yes	

- WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, in order to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. **WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.**

  According to s. NR 106.08(6)(d), TUa effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC50, IC25 or IC 50 ≥ 100%.). **In this case, all the IC_{25} results have been >100, so there is no chronic WET reasonable potential, and no chronic WET limit is needed for permit reissuance**

The WET Checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other permit conditions. The Checklist steps the user through a series of questions that evaluate the potential for effluent toxicity. The Checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code, and recommends monitoring frequencies based on points accumulated during the Checklist analysis. As toxicity potential increases, more points accumulate and more monitoring is recommended to ensure that toxicity is not occurring. The completed WET Checklist recommendations for this permittee are summarized in the table below. Staff recommendations, based on the WET Checklist and best professional judgment, are provided below the summary table. For guidance related to RP and the WET Checklist, see Chapter 1.3 of the WET Guidance Document: http://dnr.wi.gov/topic/wastewater/WETguidance.html.

Attachment #1

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 9 % based on 100 % mixing with first downstream non-variance water's 7-Q_{10} **0 Points**
Historical Data	No data – **5 points**	All available WET tests have passed **0 points**
Effluent Variability	Some effluent variability for ammonia **5 Points**	Same as Acute. **5 Points**
Receiving Water Classification	> 4 miles to full fish and aquatic life water **0 Points**	Same as Acute. **0 Points**
Chemical-Specific Data	Limits for chloride based on ATC (5 pts); ammonia, copper, zinc detected (3 pts). **8 Points**	Limits for chloride based on CTC (5 pts); ammonia, copper, zinc detected (3 pts). **8 Points**
Additives	0 Biocides and 0 conventional Water Quality Conditioners added. SorbX-100 Used: Yes **15 Points**	All additives used more than once per 4 days. **15 Points**
Discharge Category	0 Industrial Contributors. **0 Points**	Same as Acute. **0 Points**
Wastewater Treatment	Secondary or Better **0 Points**	Same as Acute. **0 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**33 Points**	**28 Points**
Recommended Monitoring Frequency (from Checklist):	3 tests in 5-year permit term	3 tests in 5-year permit term
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

Following the guidance provided in the Department's WET Program Guidance Document (revision #11, dated November 1, 2016), based upon the point totals generated by the WET Checklist, other information given above, and Chapter 1.3 of the WET Guidance Document, **three acute and chronic WET tests are recommended for the five-year permit term.** Tests should be done in rotating quarters, in order to collect seasonal information about this discharge. WET testing shall continue after the permit expiration date (until the permit is reissued). Sampling acute and chronic WET concurrently with chloride is also recommended to help evaluate potential sources of toxicity, if present.

PART 7 – EXPRESSION OF LIMITS

Revisions to ch. NR 106 and 205, Wis. Adm. Code align Wisconsin's water quality-based effluent limitations with 40 CFR 122.45(d), which requires WPDES permits contain the following concentration limits, whenever practicable and necessary to protect water quality:

Attachment #1

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210, Wis. Adm. Code.
- Daily maximum and monthly average limitations for all other discharges.

Yorkville Sewer Utility District No 1 is a POTW, and is therefore subject to the need for weekly average and monthly average limitations whenever limitations are determined to be necessary.

This evaluation provides additional limitations necessary to comply with the expression of limits in s. NR 106.07, Wis. Adm. Code and or s. NR 205.065(7), Wis. Adm. Code. Pollutants already compliant with s. NR 106.07, Wis. Adm. Code, or that have an approved impracticability demonstration, are excluded from this evaluation including water-quality based effluent limitations for phosphorus, temperature, and pH, among other parameters.

Additional limitations needed to comply with s. NR 106.07 Expression of limits:

Parameter	Daily Maximum	Weekly Average	Monthly Average	Multiplication Factor (CV)	Assumed Monitoring Frequency (n)
Ammonia Nitrogen November – April May-October		 **29 mg/L** **5.1 mg/L**	 12.4 mg/L 2.2 mg/L	 2.34 (1.0) 2.34 (1.0)	 2/week (8) 2/week (8)
Chloride	760 mg/L	400 mg/L	**400 mg/L**		

The methods for calculating limitations for continuous discharges subject to ch. NR 210, Wis. Adm. Code, to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(3), Wis. Adm. Code, and are as follows:

1. Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.
2. Whenever a weekly average limitation is determined necessary to protect water quality, a monthly average limitation shall also be included in the permit and set equal to the weekly average limit unless a more restrictive limit is already determined necessary to protect water quality.
3. Whenever a monthly average limitation is determined necessary to protect water quality, a weekly average limit shall be calculated using the following procedure and included in the permit unless a more restrictive limit is already determined necessary to protect water quality:

Weekly Average Limitation = (Monthly Average Limitation x MF)

Where: MF= Multiplication factor as defined in Table 1
CV= coefficient of variation (CV) as calculated in s. NR 106.07(5m), Wis. Adm. Code
[CV = Standard deviation/arithmetic mean]
n= the number of samples per month required in the permit

Attachment #1

s. NR 106.07 (3) (e) 4. Table 1 — Multiplication Factor (for CV = 1.0)

CV	n=1	n=2	n=3	n=4	n=8	n=12	n=16	n=20	n=24	n=30
1.0	1.00	1.37	1.63	1.83	2.34	2.64	2.85	3.01	3.13	3.27

Note: This methodology is based on the *Technical Support Document for Water Quality-based Toxics Control* (March 1991). PB91-127415.

A review of the existing permit's effluent limits, plus any recommended limits from this evaluation shows that some adjustment of the weekly average ammonia nitrogen limits may be necessary to meet effluent limit expression requirements.

Effluent ammonia nitrogen data from the existing permit term shows that the coefficient of variation at Yorkville is 4.7 from May – October, and 1.6 from November – April. Both values indicate a considerably elevated level of variation, and would lead to a large than normal multiplication factor. Although the WWTF was not designed to specifically remove ammonia nitrogen, Yorkville has submitted a standard operating procedure (SOP) to the Department for control of ammonia nitrogen in the discharge. Therefore, it is believed that with better control and optimization of the wastewater treatment system to meet effluent limits, effluent variability will reduce to some extent. Thus, the maximum anticipated coefficient of variation expected at Yorkville is estimated to be 1.0.

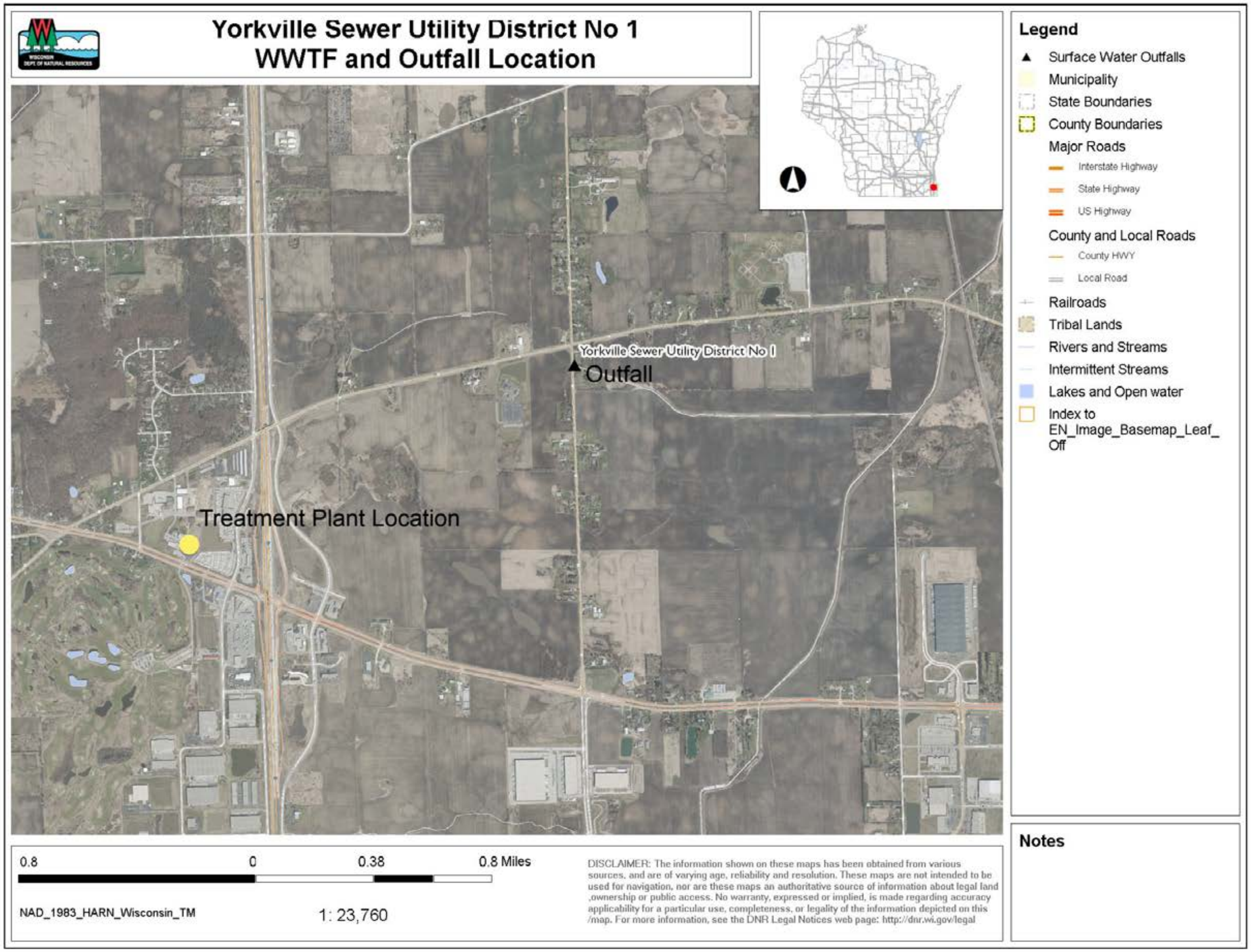
The current monitoring frequency of twice per week from November through April is not expected to change for permit reissuance. <u>The current monitoring frequency of once per month from May through October will likely change to match the twice per week requirement during November through April for permit reissuance.</u> Therefore, the number of samples per month that will likely be required in the permit is 8, rounding to the nearest whole number. With a CV of 1.0, this leads to a multiplication factor of 2.34.

Looking at the recommended monthly average limits of 12.4 mg/L from November – April and 2.2 mg/L from May - October, this would equate to a potential weekly average limit of 29 mg/L from November – April and 5.1 mg/L from May – October. **Both values are slightly below the calculated weekly average limits included in Part 3 above, and are therefore recommended for permit reissuance**.

Chloride: Weekly and monthly average effluent concentration limits of 400 mg/L would be needed unless the chloride variance application that was submitted is approved by EPA.

There are no other parameters for which additional limit expressions are needed.

Attachment #2



Appendix D

Detailed Cost Estimates

YORKVILLE SANITARY DISTRICT NO. 1
2018 NOV COMPLIANCE PLAN

ALTERNATIVE NO. 1 -
CONSTRUCT MBR TREATMENT FACILITY

COST ESTIMATE SUMMARY

General Description

This alternative considers replacing the existing complete mix activated sludge package plant with a new membrane bioreactor (MBR) to meet the new water quality based effluent limit (WQBEL) for Total Phosphorus (TP).

Summary of Initial Costs

Estimated Construction Cost Without Contingency		$3,012,000
Contingency	20%	$602,400
Estimated Construction Cost Without Markup		$3,614,400
Contractor Overhead & Profit Markup	15%	$542,160
General Conditions	5%	$180,720
Prime Contractor Markup	3%	$108,432
Estimated Construction Cost		**$4,445,712**
Engineering	20%	$889,142
Total Initial Cost		**$5,335,000**

Summary of Annual Costs

Total Annual Cost		$44,400
Life Cycle Analysis		
Interest Rate Per Year	3.875%	
Number of Years	20	
Present Worth Factor	13.742	
Present Worth of Total Annual Cost		**$610,000**

Total Present Worth **$5,795,000**

YORKVILLE SANITARY DISTRICT NO. 1
2018 NOV COMPLIANCE PLAN

ALTERNATIVE NO. 1 -
CONSTRUCT MBR TREATMENT FACILITY

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)	Service Life	Future Cost at 10 Years	Salvage Value at 20 Years
Structural							
Earthwork	See Detailed Worksheet			$125,628	N/A		
Concrete	See Detailed Worksheet			$311,016	50		$186,610
Metals	See Detailed Worksheet			$56,150	50		$33,690
Buildings	See Detailed Worksheet			$168,000	50		$100,800
Demolition	See Detailed Worksheet			$20,000	N/A		
Process Mechanical & Control Equipment and Major Piping Systems							
Raw Wastewater Pumps	EA	**2**	**$32,500**	$65,000	20		
2 mm Perforated Plate Screen	EA	**1**	**$143,000**	$143,000	20		
Stacked Tray Vortex Grit Removal	EA	**1**	**$188,500**	$188,500	20		
MBR System	LS	**1**	**$1,346,250**	$1,346,250	20		
Aeration Basin EQ Retrofit	LS	**1**	**$50,000**	$50,000	20		

Total Construction Cost Percentage-Based Estimate	Assumed % of Construction Cost	
Process-Mechanical Piping Systems	15%	$311,557
HVAC & Plumbing	5%	$103,852
Electrical & Controls	20%	$415,409
Non-Structural Sitework & Yard Piping	5%	$103,852

	Initial Cost ($)	Future Cost at 10 Years	Salvage Value at 20 Years
Sub-Total Without Contingency or Markup	$3,012,000	$0	$321,100
Present Worth of Sub-Total	**$3,012,000**	**$0**	**$150,000**

YORKVILLE SANITARY DISTRICT NO. 1
2018 NOV COMPLIANCE PLAN

ALTERNATIVE NO. 2 -
CONSTRUCT GRIT REMOVAL & SBR

COST ESTIMATE SUMMARY

General Description

This alternative considers replacing the existing complete mix activated sludge package plant with a new continuous flow sequencing batch reactor (SBR) to address the NOVs.

Summary of Initial Costs

Estimated Construction Cost Without Contingency		$2,260,000
Contingency	20%	$452,000
Estimated Construction Cost Without Markup		$2,712,000
Contractor Overhead & Profit Markup	15%	$406,800
General Conditions	5%	$135,600
Prime Contractor Markup	3%	$81,360
Estimated Construction Cost		**$3,335,760**
Engineering	20%	$667,152
Total Initial Cost		**$4,003,000**

Summary of Annual Costs

Total Annual Cost		$31,500
Life Cycle Analysis		
Interest Rate Per Year	3.875%	
Number of Years	20	
Present Worth Factor	13.742	
Present Worth of Total Annual Cost		**$433,000**

Total Present Worth **$4,264,000**

YORKVILLE SANITARY DISTRICT NO. 1
2018 NOV COMPLIANCE PLAN

ALTERNATIVE NO. 2 -
CONSTRUCT GRIT REMOVAL & SBR

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)	Service Life	Future Cost at 10 Years	Salvage Value at 20 Years
Structural							
Earthwork	See Detailed Worksheet			$167,906	N/A		
Concrete	See Detailed Worksheet			$347,157	50		$208,294
Metals	See Detailed Worksheet			$46,100	50		$27,660
Buildings	See Detailed Worksheet			$218,750	50		$131,250
Demolition	See Detailed Worksheet			$20,000	N/A		
Process Mechanical & Control Equipment and Major Piping Systems							
Raw Wastewater Pumps	EA	**2**	**$32,500**	$65,000	20		
Grit Removal System	LS	**1**	**$188,500**	$188,500	20		
Xylem ICEAS Equipment	LS	**1**	**$708,750**	$708,750	20		
Aeration Basin EQ Retrofit	LS	**1**	**$50,000**	$50,000	20		

Total Construction Cost Percentage-Based Estimates	Assumed % of Construction Cost	
Process-Mechanical Piping Systems	15%	$233,799
HVAC & Plumbing	5%	$77,933
Electrical & Controls	20%	$311,733
Non-Structural Sitework & Yard Piping	5%	$77,933

	Initial Cost ($)	Future Cost at 10 Years	Salvage Value at 20 Years
Sub-Total Without Contingency or Markup	$2,260,000	$0	$367,204
Present Worth of Sub-Total	**$2,260,000**	**$0**	**$172,000**

YORKVILLE SANITARY DISTRICT NO. 1
2018 NOV COMPLIANCE PLAN

ALTERNATIVE NO. 3 -

CONSTRUCT GRIT REMOVAL & AquaNereda AEROBIC GRANULAR SLUDGE SYSTEM

COST ESTIMATE SUMMARY

General Description

This alternative considers replacing the existing complete mix activated sludge package plant with a new aerobic granular sludge system to address the NOVs.

Summary of Initial Costs

Estimated Construction Cost Without Contingency		$3,401,000
Contingency	20%	$680,200
Estimated Construction Cost Without Markup		$4,081,200
Contractor Overhead & Profit Markup	15%	$612,180
General Conditions	5%	$204,060
Prime Contractor Markup	3%	$122,436
Estimated Construction Cost		**$5,019,876**
Engineering	20%	$1,003,975
Total Initial Cost		**$6,024,000**

Summary of Annual Costs

Total Annual Cost		$31,500
Life Cycle Analysis		
Interest Rate Per Year	3.875%	
Number of Years	20	
Present Worth Factor	13.742	
Present Worth of Total Annual Cost		**$433,000**

Total Present Worth **$6,299,000**

YORKVILLE SANITARY DISTRICT NO. 1
2018 NOV COMPLIANCE PLAN

ALTERNATIVE NO. 3 -
CONSTRUCT GRIT REMOVAL & AquaNereda AEROBIC GRANULAR SLUDGE SYSTEM

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)	Service Life	Future Cost at 10 Years	Salvage Value at 20 Years
Structural							
Earthwork	See Detailed Worksheet			$150,353	N/A		
Concrete	See Detailed Worksheet			$298,028	50		$178,817
Metals	See Detailed Worksheet			$46,100	50		$27,660
Buildings	See Detailed Worksheet			$218,750	50		$131,250
Demolition	See Detailed Worksheet			$20,000	N/A		
Process Mechanical & Control Equipment and Major Piping Systems							
Raw Wastewater Pumps	EA	**2**	**$32,500**	$65,000	20		
Grit Removal System	LS	**1**	**$188,500**	$188,500	20		
AquaNereda Equipment	LS	**1**	**$1,562,500**	$1,562,500	20		
Aeration Basin EQ Retrofit	LS	**1**	**$50,000**	$50,000	20		

Total Construction Cost Percentage-Based Estimates	Assumed % of Construction Cost	
Process-Mechanical Piping Systems	15%	$351,860
HVAC & Plumbing	5%	$117,287
Electrical & Controls	20%	$469,146
Non-Structural Sitework & Yard Piping	5%	$117,287

	Initial Cost ($)	Future Cost at 10 Years	Salvage Value at 20 Years
Sub-Total Without Contingency or Markup	$3,401,000	$0	$337,727
Present Worth of Sub-Total	**$3,401,000**	**$0**	**$158,000**

YORKVILLE SANITARY DISTRICT NO. 1
2018 NOV COMPLIANCE PLAN

ALTERNATIVE NO. 4 -

CONSTRUCT PRIMARY FILTRATION, NEW FINAL CLARIFIER, RAS & WAS PUMPING & ADD SUPPLEMENTAL AERATION

COST ESTIMATE SUMMARY

General Description

This alternative considers constructing a new final clarifier with RAS & WAS Pumping and a building to house primary filtration to address the NOVs. Supplemental aeration will also be added to the existing aeration basin.

Summary of Initial Costs

Estimated Construction Cost Without Contingency		$2,336,000
Contingency	20%	$467,200
Estimated Construction Cost Without Markup		$2,803,200
Contractor Overhead & Profit Markup	15%	$420,480
General Conditions	5%	$140,160
Prime Contractor Markup	3%	$84,096
Estimated Construction Cost		**$3,447,936**
Engineering	20%	$689,587
Total Initial Cost		**$4,138,000**

Summary of Annual Costs

Total Annual Cost	$20,500

Life Cycle Analysis

Interest Rate Per Year	3.875%
Number of Years	20
Present Worth Factor	13.742

Present Worth of Total Annual Cost	**$282,000**

Total Present Worth	**$4,134,000**

YORKVILLE SANITARY DISTRICT NO. 1
2018 NOV COMPLIANCE PLAN

ALTERNATIVE NO. 4 -
CONSTRUCT PRIMARY FILTRATION, NEW FINAL CLARIFIER, RAS & WAS PUMPING

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)	Service Life	Future Cost at 10 Years	Salvage Value at 20 Years
Structural							
Earthwork	See Detailed Worksheet			$190,064	N/A		
Concrete	See Detailed Worksheet			$754,860	50		$452,916
Metals	See Detailed Worksheet			$46,100	50		$27,660
Buildings	See Detailed Worksheet			$218,750	50		$131,250
Demolition	See Detailed Worksheet			$20,000	N/A		
Process Mechanical & Control Equipment and Major Piping Systems							
Raw Wastewater Pumps	EA	**2**	**$32,500**	$65,000	20		
Primary Filtration System	LS	**1**	**$227,500**	$227,500	20		
40' Diameter Final Clarifier Equipmer	LS	**1**	**$112,500**	$112,500	20		
RAS Pumps	EA	**2**	**$18,750**	$37,500	20		
WAS Pumps	EA	**2**	**$12,500**	$25,000	20		
Jet Aerators	EA	**3**	**$68,750**	$206,250	20		

Total Construction Cost Percentage-Based Estimates	Assumed % of Construction Cost	
Process-Mechanical Piping Systems	15%	$241,654
HVAC & Plumbing	5%	$80,551
Electrical & Controls	20%	$322,205
Non-Structural Sitework & Yard Piping	5%	$80,551

	Initial Cost ($)	Future Cost at 10 Years	Salvage Value at 20 Years
Sub-Total Without Contingency or Markup	$2,336,000	$0	$611,826
Present Worth of Sub-Total	**$2,336,000**	**$0**	**$286,000**

Appendix A - NOV Report

Building a Better World for All of Us®

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Appendix B

Foxconn Related Regional Discussions

Attendees: Peter Hansen, Jonathon Delagrave, Matt Maroney, Claude Lois, Russel Clark, Jeff Neubauer, Alexandra Tillman, Michael Lanzdorf, Debbie Tamzyck, Dave Anderson, Tim Pruitt, Jon Cameron, Stevin George and Art Harrington.

After opening remarks by Jonathon/Matt, the Chairman made opening remarks about desire of Town to be a good regional partner subject to Town residents desires and reasonable cost constraints.

After these opening remakes,

- Jon went through his spreadsheets for the 20/30 year options for Racine/Mt. Pleasant sewer/water (attached),
- I went through Town background introductory talking points (attached)
- I went through the Team's deal points with much input from Peter/Tim (see attached) *which included a clarification on the capacity charges for Town/City ($2M per mgd for first five years and beyond)*.
- The only documents distributed to the attendees were the Cameron spreadsheets.

After these Yorkville presentations, Claude Lois mentioned that the Mt. Pleasant sewer/water upgrade requirements went from $49M to $77M resulting from agreement reached with Caledonia for more capacity. He stated he was looking for more participation from Town in these increased costs. (We were puzzled why Mt. Pleasant should be looking to the Town for any of these upgrade costs resulting from recent discussions/agreements with Caledonia).

After going through the Town deal points, there really wasn't any serious objections/concerns raised about our deal points except:

- Mt. Pleasant
  - looking for guarantee from Town for payment of **all** Town prorated upgrade costs and financing charges
  - Wanted additional upsizing costs from Town . See above.
  - Not willing to make upsizing for Town contingent upon incorporation referendum and Yorkville Legislation.
- County: Pushback from Dave Anderson on our suggested County backstop

After a brief break, we came back and Jon Cameron went through the Stand-along Option spreadsheets. All agreed it was important to understand this option for a "take it or leave it" offer to the City. We also made it clear that our proposal for payback to Mt. Pleasant for the Sewer/Water costs was no guaranty and dependent upon available Yorkville TIF increment by the end of the TIF

Matt and Jonathon at that point wanted to know if Yorkville was OK with Jonathon/Matt making the proposal outlined by Yorkville in our talking points. We asked for a brief opportunity for a breakout session for the Yorkville Team to discuss. During the breakout, we discussed the political implications of the town residents learning about a proposal made by Yorkville to the City; even if rejected since the proposal could become publically available. Given the recent public informational and Public hearing comments, the Team decided not to authorize an offer based upon the discussions at this meeting and the spreadsheet results demonstrating significant cost risk for Yorkville with no developer guarantying any cost recovery for Yorkville at this point.

After the breakout, Peter told the assembled group that the economics that we outlined at the meeting are too uncertain and we do NOT want an offer made to the City as we had outlined in our talking points. Peter indicated his preference of a "go slow" approach for Yorkville considering a stand-alone option outlined or other alternative sewer/water options rather than the Racine/Mt. Pleasant option and its accompanying Yorkville cost commitments with no development guarantees.

All in attendance understood Yorkville's position and there was consensus that, under the circumstances, it was the reasonable approach for Yorkville to take. *We gathered up all spreadsheets at the conclusion of the meeting.*

PRIVILEGED AND CONFIDENTIAL

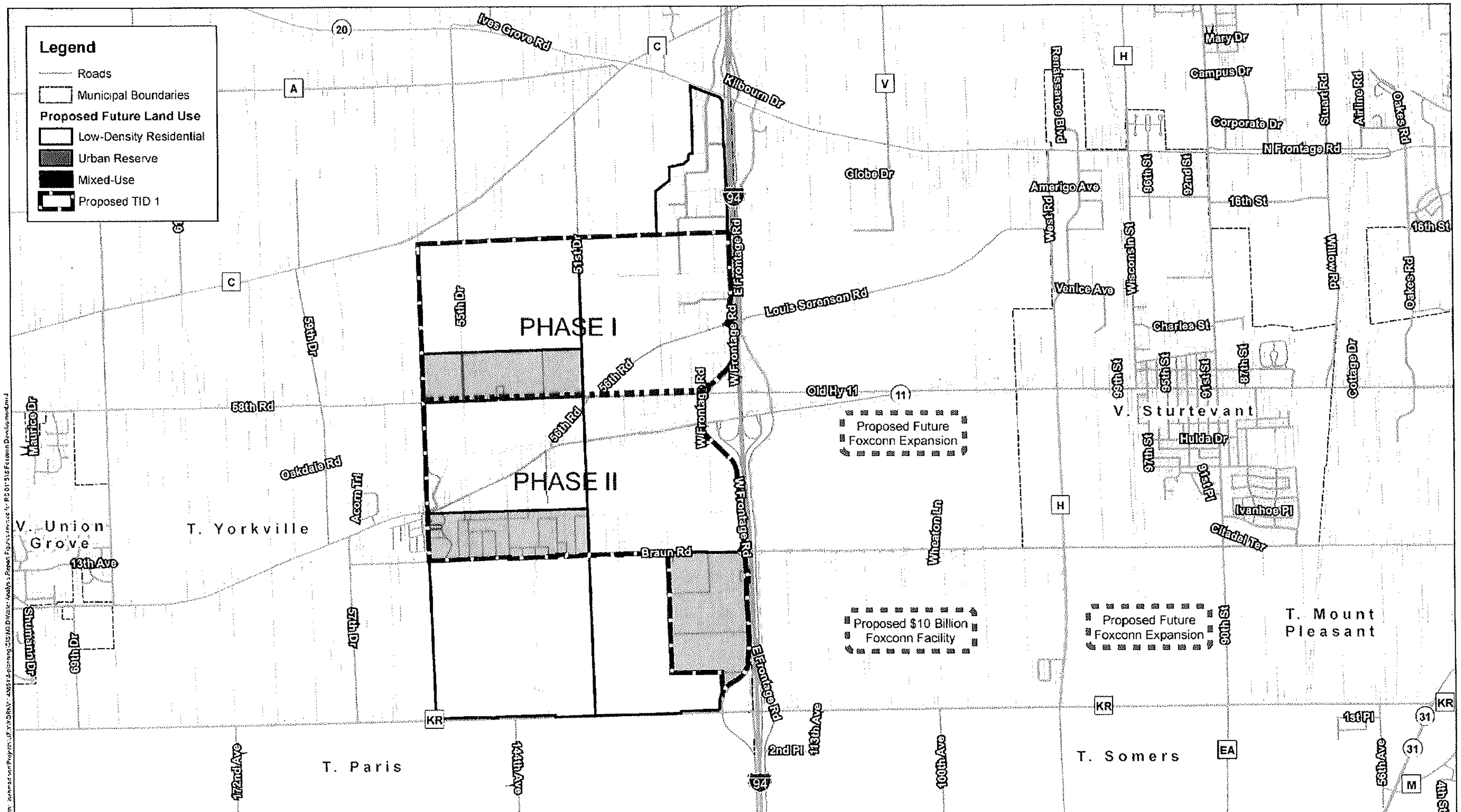
Talking Points for County/Racine/Mt. Pleasant/Yorkville Negotiations
for
Sewer and Water

- Town/Mt. Pleasant
  - Mt. Pleasant installs Sewer/Water infrastructure of sufficient size to meet Town's recent sewer/water projections (current estimate: $49M) ("Town Sewer/Water Costs") to be financed by County and/or Mt. Pleasant and associated financing costs to be included in TID 5.
  - Assuming Sewer/Water services are available in the defined sewer service area ("SW Area"), Yorkville will refrain from utilizing other options in the SW Area (e.g. Stand-alone, Union Grove, Kenosha, Milwaukee, etc.).
  - Once incorporated, Village will take reasonable action to create a TID by on or after October 1, 2018, once appropriate private development commitments are secured.
  - TID area covered by the agreement. *See* attached.
  - TID revenue waterfall pays reasonable infrastructure costs incurred by Yorkville for TID infrastructure costs first ("TID Costs") over the shorter of 20 years or the remaining life of the TID.
  - After annual instalment of TID Costs are paid, excess increment is allocated between Mt. Pleasant (as reimbursement for County and/or Mt. Pleasant financed Town proration costs for Sewer/Water) and private developer/end user incentive payments necessary to generate increment (to be identified and approved by Yorkville and Mt. Pleasant).
  - Mt. Pleasant O&M charges for Sewer shall be limited to the dedicated sewer interceptor costs.
  - No assessment to Yorkville for Mt. Pleasant storm water infiltration infrastructure costs.
  - No challenge to Town incorporation by Mt. Pleasant.
  - Mt Pleasant supports Yorkville proposed TID legislation (30 year TID, increment available to pay revenue sharing and other related operating expenses and eliminating limit on cost expenditures for last 5 years of TID) ("Yorkville Legislation").
  - Agreement is null and void if no incorporation, sewer/water services contemplated by this agreement are not available or no Yorkville Legislation enacted.

- Town/City
  - Town has reduced residential density in its last proposed use map subject to final land use approval process completion. *See* attached residential projects/land use map.
  - City/RWU includes the attached Town sewer service area in the application for the water diversion. *See* attached proposed service area.
  - Upon issuance of the DNR decision and conditioned upon Yorkville incorporation receiving water and sewer service, and enactment of the Yorkville Legislation, Yorkville will execute 2002 Sewer Agreement and become a retail customer of RWU.

- Assuming Sewer/Water services are available in the defined sewer service area ("SW Area"), Yorkville will refrain from utilizing other options in the SW Area (e.g. Stand-alone, Union Grove, Kenosha, Milwaukee, etc.).
- Revenue Sharing. Agree to 16% under the 2002 Sewer Agreement and an additional 4% under the same formula under the 2002 Sewer Agreement and would not kick in until TID closed. Flexible on a time period (but not in perpetuity).
- Sewer Capacity Charges. "Take or Pay" 2mgd for first 5 years and any additional capacity required by Yorkville after that time period will be assessed in accordance with the formula described in the 2002 Sewer Agreement.
- Reasonable Deficiency charges for water in water rate will be included in water rates for retail customers.
- City supports Yorkville Legislation.
- Agreement is null and void if no incorporation, Sewer/Water services contemplated by this agreement are not provided or no Yorkville Legislation enacted.

- Town/County
    - County agrees to finance applicable portion of Town Sewer/Water Costs.
    - County to provide a "back stop" to pay any deficiency of TID Cost at end of TID.
    - County agrees to support the Yorkville Legislation.



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PROPOSED TID #1
TOWN OF YORKVILLE
Racine County, Wisconsin

Table 2 - Population Growth

Area Number	Basin	Planned Land Use	Area (Acres)	Persons Per Household	Households Per Acre[1,2]	Persons Per Acre	Population Estimate
2	Mississippi River	Residential	549	2.5	5.9	14.8	8,125
3	Great Lakes	Residential	233		2.3	5.8	1,337
3	Mississippi River	Residential	320			5.8	1,842
4	Great Lakes	Mixed-Use	105			5.8	605
4	Mississippi River	Mixed-Use	60			5.8	342
6	Great Lakes	Mixed-Use	145			5.8	836
7	Great Lakes	Residential	380			5.8	2,185
		Total	**1,792**			**Total**	**15,300**

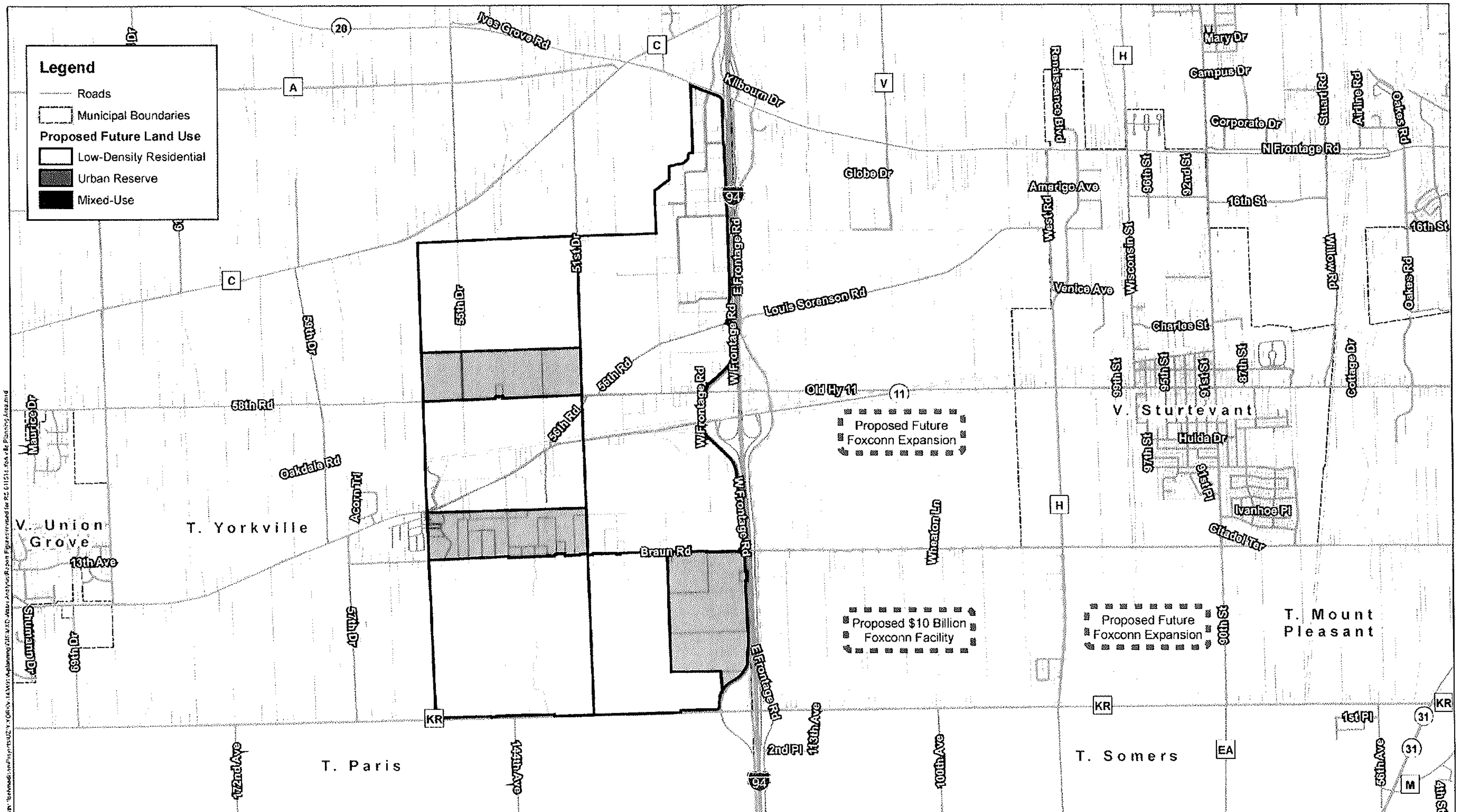
1. Area 2 assumes 25 percent of the 13,000 employee families will live in Area 2.

2. Dwelling density of 2.3 Based on Table 22 of "A Land Use Plan for the Village of Union Grove and the Town of Yorkville: 2020" SEWRPC

Table 2 - Population Growth

Area Number	Basin	Planned Land Use	Area (Acres)	Persons Per Household	Households Per Acre[1]	Persons Per Acre	Population Estimate
2	Mississippi River	Residential	401	2.5	2.3	5.8	2,303
3	Great Lakes	Residential	233				1,337
3	Mississippi River	Residential	320				1,842
4	Great Lakes	Mixed-Use	105				605
4	Mississippi River	Mixed-Use	60				342
6	Great Lakes	Mixed-Use	145				836
7	Great Lakes	Residential	380				2,185
		Total	**1,644**			**Total**	**9,450**

1. Dwelling density of 2.3 Based on Table 22 of "A Land Use Plan for the Village of Union Grove and the Town of Yorkville: 2020" SEWRPC



0 1,500 3,000 Ft

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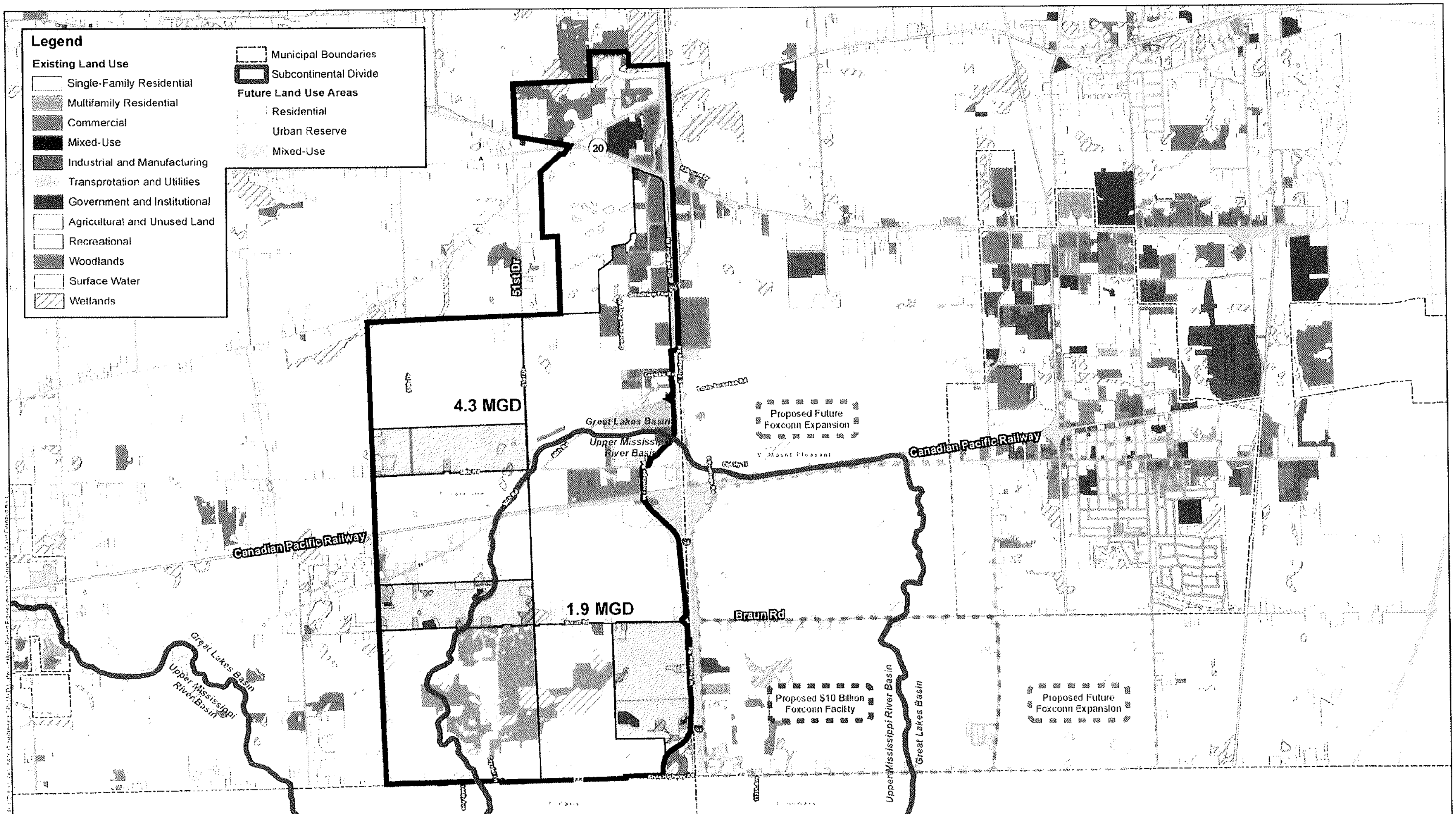
Map by: rdahl
Projection: State Plane Wisconsin South FIPS 4803
Source: Racine County
Print Date: 1/15/2018

YORKVILLE PLANNING AREA

TOWN OF YORKVILLE

Racine County, Wisconsin



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MAXIMUM DAY WATER DEMANDS FOR PROPOSED SEWER SERVICE AREA FOR RACINE GREAT LAKES WATER DIVERSION APPLICATION

Town of Yorkville, Racine County, Wisconsin

Figure 2

Schedule of Estimated Debt Service Payments Allocable to Yorkville

	Village 2018 TIF Revenue Bond	County 2018 G.O. Bond	Village 2020 CWFL*	**Total**
Project Costs				
Water	-	20,858,600	-	**20,858,600**
Sewer	11,088,473	8,238,567	8,672,960	**28,000,000**
Subtotal	11,088,473	29,097,167	8,672,960	**48,858,600**
Finance Cost Allocations				
Capitalized Interest	1,525,267	3,701,277	701,120	**5,927,663**
Cost of Issuance/Discount	238,677	519,063	39,001	**796,740**
Debt Service Reserve	867,082	-	-	**867,082**
Temp. Inv. Of Proceeds	(20,160)	(72,506)	(21,542)	**(114,208)**
Subtotal	2,610,865	4,147,833	718,579	**7,477,277**
Total Bond Allocation	**13,700,000**	**33,245,000**	**9,390,000**	**56,335,000**
Percentage of Issue	9.62%	100.00%	16.66%	

**Finance Cost Allocations are from associated 2018 Village RBAN which is refunded by the 2020 CWFL*

	Estimated P&I	Less Cap Int. & DSR	Total	Estimated P&I	Less Cap Int.	Total	Estimated P&I	**Total**
2019	748,933	(748,933)	0	1,817,393	(1,817,393)	0	0	**0**
2020	548,000	(548,000)	0	1,329,800	(1,329,800)	0	231,620	**231,620**
2021	548,000	(228,333)	319,667	1,329,800	(554,083)	775,717	538,509	**1,633,892**
2022	548,000		548,000	1,329,800		1,329,800	538,509	**2,416,309**
2023	548,000		548,000	1,329,800		1,329,800	538,509	**2,416,309**
2024	867,005		867,005	2,946,800		2,946,800	538,509	**4,352,313**
2025	866,707		866,707	2,949,400		2,949,400	538,509	**4,354,615**
2026	866,832		866,832	2,949,200		2,949,200	538,509	**4,354,540**
2027	866,870		866,870	2,946,200		2,946,200	538,509	**4,351,579**
2028	866,803		866,803	2,945,300		2,945,300	538,509	**4,350,612**
2029	867,082		867,082	2,946,300		2,946,300	538,509	**4,351,890**
2030	866,726		866,726	2,949,000		2,949,000	538,509	**4,354,235**
2031	866,678		866,678	2,948,300		2,948,300	538,509	**4,353,486**
2032	866,899		866,899	2,949,100		2,949,100	538,509	**4,354,508**
2033	866,880		866,880	2,946,300		2,946,300	538,509	**4,351,688**
2034	867,072		867,072	2,944,800		2,944,800	538,509	**4,350,381**
2035	866,966		866,966	2,944,400		2,944,400	538,509	**4,349,875**
2036	867,014		867,014	2,944,900		2,944,900	538,509	**4,350,423**
2037	866,707		866,707	2,946,100		2,946,100	538,509	**4,351,315**
2038	866,966		866,966	2,947,800		2,947,800	538,509	**4,353,275**
2039	866,793		866,793	0		0	538,509	**1,405,302**
2040	866,639		866,639	0		0	538,509	**1,405,148**
2041	866,937		866,937	0		0	538,509	**1,405,446**
2042	866,687		866,687	0		0	538,509	**1,405,196**
2043	866,812		866,812	0		0	538,509	**1,405,321**
2044	866,784		866,784	0		0	538,509	**1,405,292**
2045	867,034		867,034	0		0	538,509	**1,405,542**
2046	867,034		867,034	0		0	538,509	**1,405,542**
2047	866,745		866,745	0		0	538,509	**1,405,254**
2048	866,601	(867,082)	(481)	0		0	538,509	**538,028**
Total	24,612,205	(2,392,348)	22,219,857	51,340,493	(3,701,277)	47,639,217	15,309,864	85,168,938

Difference between $85,168,938 (Total Principal and Interest) and $48,858,600 (Project funding amount)> **36,310,338**

Village of Yorkville

Tax Increment District #1

Estimated Project List

Mount Pleasant Water and Sewer Capacity Costs		Total Cost
Mount Pleasant Water & Sewer Capacity Costs (TID #5)[2]		$48,858,600
Purchased Sewer Capacity Costs		
Estimated Cost for sewer capacity lease (2 mgd)[5]	2019	$2,000,000
Estimated Additional sewer capacity purchase (4 mgd)[6]	2023	$40,000,000
Subtotal Water and Sewer Capacity Costs		**$90,858,600**

Physical Infrastructure Costs within the Village of Yorkville[3]

PHASE I - Short-Term Improvements (2019 & 2022) (4yr)	Year	Improvements
Major Roads:		
58th Road (EW) 1000' west of I-94 ramp to 51st	2020	$3,000,000
Louis Sorensen Rd (EW) 1000' west of I-94 to 51st	2021	$4,300,000
Minor Roads:		
51st Drive-Louis Sorensen to North proj boundary	2019	$2,960,000
55th Drive- 58th Road north to project boundary	2021	$4,240,000
Local Roads:		
Local in West Section[4]	2021	$4,530,000
Local in East Section[4]	2020	$4,020,000
Lift Station	2019	$350,000
Force Main	2019	$1,125,000
Sanitary sewer from offsite to LS - 42"	2019	$256,000
Sanitary sewer from offsite to LS - 30"	2019	$132,000
Water Main - 20"	2019	$3,520,000
Subtotal Short Term Improvements		**$28,433,000**

PHASE II - Intermediate-Term Improvements (2023-2030) (7 year)	Year	Improvements
Major Roads:		
Braun Rd-1000' west of I-94 to 51st	2023	$4,000,000
51st Drive to west proj boundary	2023	$5,300,000
51st Drive to 55th Drive	2025	$3,950,000
Minor Roads:		
Braun to Louis Sorensen	2024	$5,520,000
Southern (EW), Between I-94 I& 51st[4]	2026	$3,060,000
Local in North section[4]	2027	$1,650,000
Subtotal Intermediate Improvements		**$23,480,000**
Subtotal Physical Infrastructure Costs within the Village of Yorkville		**$51,913,000**

Total TID Costs $142,771,600

Notes:
1. All costs are reported in 2018 dollars.
2. Costs to Mount Pleasant are based upon the estimated P&I schedule provided by the Village of Mt.Pleasant
3. Infrastructure cost estimates for costs within the Village of Yorkville were developed by SEH Engineers, January 15, 2018.
4. Costs highlighted in Phases I & II may be special assessible.
5. It is currently assumed Yorkville would be required to enter into a 5-year interest only lease with Racine for 2MGD of capacity at $4.0 per 1 MGD at 5.00% interest.
6. It is currently assumed at the conclusion of the 5-year lease with Racine, Yorkville will be required to purchase 4.0 MGD of capacity at a purchase price of $10.0 million per 1 MGD.

Village of Yorkville

Tax Increment District #1

Development Assumptions

Construction Year		Phase I				Phase II				Annual Total	Construction Year	
		% Developed	# Acres[1]	Value/Acre[2]	Value Added	% Developed	# Acres[1]	Value/Acre[2]	Value Added			
Total Acres			1,000				1,400					
1	2019	0%	0	520,569	0					0	2019	1
2	2020	10%	100	520,569	52,056,900					52,056,900	2020	2
3	2021	10%	100	520,569	52,056,900					52,056,900	2021	3
4	2022	10%	100	520,569	52,056,900					52,056,900	2022	4
5	2023	10%	100	520,569	52,056,900		50	520,569	26,028,450	78,085,350	2023	5
6	2024	10%	100	520,569	52,056,900		90	520,569	46,851,210	98,908,110	2024	6
7	2025	10%	100	520,569	52,056,900		90	520,569	46,851,210	98,908,110	2025	7
8	2026	10%	100	520,569	52,056,900		90	520,569	46,851,210	98,908,110	2026	8
9	2027	10%	100	520,569	52,056,900		90	520,569	46,851,210	98,908,110	2027	9
10	2028	10%	100	520,569	52,056,900		90	520,569	46,851,210	98,908,110	2028	10
11	2029	10%	100	520,569	52,056,900		90	520,569	46,851,210	98,908,110	2029	11
12	2030						90	520,569	46,851,210	46,851,210	2030	12
13	2031						90	520,569	46,851,210	46,851,210	2031	13
14	2032						90	520,569	46,851,210	46,851,210	2032	14
15	2033						90	520,569	46,851,210	46,851,210	2033	15
16	2034						90	520,569	46,851,210	46,851,210	2034	16
17	2035						90	520,569	46,851,210	46,851,210	2035	17
18	2036						90	520,569	46,851,210	46,851,210	2036	18
19	2037						90	520,569	46,851,210	46,851,210	2037	19
20	2038						90	520,569	46,851,210	46,851,210	2038	20
Totals			1,000		520,569,000		1,400		728,796,600	1,249,365,600		

Notes:

[1]The amount of developable acres in Phase I & II were developed by SEH Engineers and reflect adjustments for rights of way and other non-buildable conditions within the TID.

[2]Value per acre Area II and Area III is equal to January 1, 2017 actual average assessed value per acre for taxable developed lots located within the Renaissance Business Park in the Village of Sturtevant.

Village of Yorkville

Tax Increment District #1

Tax Increment Projection Worksheet

Type of District	Mixed Use	Base Value	
District Creation Date	October 1, 2018	Appreciation Factor	0.00%
Valuation Date	Jan 1, 2019	Base Tax Rate	$15.72
Max Life (Years)	20	Rate Adjustment Factor	0.00%
Expenditure Period/Termination	15 10/1/2033		
Revenue Periods/Final Year	20 2040		
Extension Eligibility/Years	Yes 3	Tax Exempt Discount Rate	
Recipient District	No	Taxable Discount Rate	5.00%

	Construction Year	Value Added	Valuation Year	Inflation Increment	Total Increment	Revenue Year	Tax Rate	Tax Increment	Taxable NPV Calculation
1	2019	0	2020	0	0	2021	$15.72	0	0
2	2020	52,056,900	2021	0	52,056,900	2022	$15.72	818,361	673,268
3	2021	52,056,900	2022	0	104,113,800	2023	$15.72	1,636,722	1,955,682
4	2022	52,056,900	2023	0	156,170,700	2024	$15.72	2,455,083	3,787,703
5	2023	78,085,350	2024	0	234,256,050	2025	$15.72	3,682,625	6,404,876
6	2024	98,908,110	2025	0	333,164,160	2026	$15.72	5,237,511	9,949,830
7	2025	98,908,110	2026	0	432,072,270	2027	$15.72	6,792,397	14,328,270
8	2026	98,908,110	2027	0	530,980,380	2028	$15.72	8,347,284	19,452,778
9	2027	98,908,110	2028	0	629,888,490	2029	$15.72	9,902,170	25,242,372
10	2028	98,908,110	2029	0	728,796,600	2030	$15.72	11,457,056	31,622,089
11	2029	98,908,110	2030	0	827,704,710	2031	$15.72	13,011,942	38,522,600
12	2030	46,851,210	2031	0	874,555,920	2032	$15.72	13,748,467	45,466,510
13	2031	46,851,210	2032	0	921,407,130	2033	$15.72	14,484,992	52,434,038
14	2032	46,851,210	2033	0	968,258,340	2034	$15.72	15,221,517	59,407,191
15	2033	46,851,210	2034	0	1,015,109,550	2035	$15.72	15,958,042	66,369,632
16	2034	46,851,210	2035	0	1,061,960,760	2036	$15.72	16,694,567	73,306,569
17	2035	46,851,210	2036	0	1,108,811,970	2037	$15.72	17,431,092	80,204,644
18	2036	46,851,210	2037	0	1,155,663,180	2038	$15.72	18,167,617	87,051,828
19	2037	46,851,210	2038	0	1,202,514,390	2039	$15.72	18,904,142	93,837,325
20	2038	46,851,210	2039	0	1,249,365,600	2040	$15.72	19,640,667	100,551,485
	Totals	1,249,365,600		0		Future Value of Increment		213,592,255	

Notes:

Actual results will vary depending on development, inflation of overall tax rates.

NPV calculations represent estimated amount of funds that could be borrowed (including project cost, capitalized interest and issuance costs).

Village of Yorkville

Tax Increment District #1

Estimated Financing Plan

		2019 7/19/2019		2023 7/19/2023		2026 7/19/2026	Totals
Projects							
Phase I		28,433,000					28,433,000
Phase II				14,820,000			14,820,000
Phase II						8,660,000	8,660,000
Total Project Funds		28,433,000		14,820,000		8,660,000	51,913,000
Estimated Finance Related Expenses							
Municipal Advisor		64,600		53,300		42,100	
Bond Counsel		30,000		25,000		20,000	
Disclosure Counsel		18,000		15,000		12,000	
Paying Agent		675		675		675	
Underwriter Discount	12.50	435,000	12.50	227,500	12.50	133,750	
Capitalized Interest		5,858,000		3,063,667		1,801,167	
Total Financing Required		34,839,275		18,205,142		10,669,692	
Estimated Interest	0.25%	(35,541)	0.25%	(18,525)	0.25%	(10,825)	
Assumed spend down (months)	6		6		6		
Rounding		(3,734)		13,383		41,133	
Net Issue Size		34,800,000		18,200,000		10,700,000	63,700,000

Notes:

Village of Yorkville

Tax Increment District #1

Cash Flow Projection

Year	Projected Revenues				
	Tax Increments	Special Assessments	Capitalized Interest	Other Revenue	Total Revenues
2019			5,858,000		5,858,000
2020					0
2021	0	520,608			520,608
2022	818,361	1,107,264			1,925,625
2023	1,636,722	1,107,264	3,063,667		5,807,653
2024	2,455,083	1,107,264			3,562,348
2025	3,682,625	1,107,264			4,789,889
2026	5,237,511	1,107,264	1,801,167		8,145,942
2027	6,792,397	1,503,548			8,295,945
2028	8,347,284	1,717,231			10,064,514
2029	9,902,170	1,717,231			11,619,400
2030	11,457,056	1,717,231			13,174,286
2031	13,011,942	1,196,622			14,208,564
2032	13,748,467	609,967			14,358,434
2033	14,484,992	609,967			15,094,959
2034	15,221,517	609,967			15,831,484
2035	15,958,042	609,967			16,568,009
2036	16,694,567	609,967			17,304,534
2037	17,431,092	213,683			17,644,775
2038	18,167,617	0			18,167,617
2039	18,904,142	0			18,904,142
2040	19,640,667	0			19,640,667
Total	213,592,255	17,172,307	10,722,833	0	241,487,395

Year	Expenditures								
	Phase I Costs Issuance 34,800,000 Dated Date: 07/19/19			Phase II Costs Issuance 18,200,000 Dated Date: 07/19/23			Phase II Costs Issuance 10,700,000 Dated Date: 07/19/26		
	Principal	Est. Rate	Interest	Principal	Est. Rate	Interest	Principal	Est. Rate	Interest
2019									
2020		5.00%	2,378,000						
2021		5.00%	1,740,000						
2022		5.00%	1,740,000						
2023	250,000	5.00%	1,733,750						
2024	250,000	5.00%	1,721,250		5.00%	1,243,667			
2025	500,000	5.00%	1,702,500		5.00%	910,000			
2026	1,500,000	5.00%	1,652,500		5.00%	910,000			
2027	1,500,000	5.00%	1,577,500	500,000	5.00%	897,500		5.00%	731,167
2028	1,500,000	5.00%	1,502,500	500,000	5.00%	872,500		5.00%	535,000
2029	1,500,000	5.00%	1,427,500	1,000,000	5.00%	835,000		5.00%	535,000
2030	1,500,000	5.00%	1,352,500	1,000,000	5.00%	785,000	500,000	5.00%	522,500
2031	1,500,000	5.00%	1,277,500	1,000,000	5.00%	735,000	500,000	5.00%	497,500
2032	2,000,000	5.00%	1,190,000	1,500,000	5.00%	672,500	500,000	5.00%	472,500
2033	3,000,000	5.00%	1,065,000	1,500,000	5.00%	597,500	1,000,000	5.00%	435,000
2034	3,000,000	5.00%	915,000	1,500,000	5.00%	522,500	1,000,000	5.00%	385,000
2035	3,000,000	5.00%	765,000	1,500,000	5.00%	447,500	1,000,000	5.00%	335,000
2036	3,000,000	5.00%	615,000	1,500,000	5.00%	372,500	1,000,000	5.00%	285,000
2037	3,000,000	5.00%	465,000	1,500,000	5.00%	297,500	1,000,000	5.00%	235,000
2038	3,600,000	5.00%	300,000	1,700,000	5.00%	217,500	1,000,000	5.00%	185,000
2039	4,200,000	5.00%	105,000	1,750,000	5.00%	131,250	1,500,000	5.00%	122,500
2040				1,750,000	5.00%	43,750	1,700,000	5.00%	42,500
Total	34,800,000		25,225,500	18,200,000		10,491,167	10,700,000		5,318,667

Year	Expenditures							Balances			Year
	Sewer Capacity Lease 8,000,000 01/01/19 Total Annual Lease Pymt		Sewer Capacity 40,000,000 01/01/23 Total Annual Payment		Mount Pleasant Water/Sewer 48,858,600 Total Annual Payment	Admin.	Total Expenditures	Annual	Cumulative	Principal Outstanding	Year
2019	5.00%	400,000				50,000	450,000	5,408,000	5,408,000		2019
2020	5.00%	400,000				51,000	2,829,000	(2,829,000)	2,579,000		2020
2021	5.00%	400,000				52,020	2,192,020	(1,671,412)	907,588		2021
2022	5.00%	400,000				53,060	2,193,060	(267,435)	640,153		2022
2023	5.00%	400,000				54,122	2,437,872	3,369,781	4,009,935		2023
2024			5.00%	3,547,966		55,204	6,818,086	(3,255,739)	754,196		2024
2025			5.00%	3,547,966		56,308	6,716,774	(1,926,885)	(1,172,689)		2025
2026			5.00%	3,547,966		57,434	7,667,900	478,042	(694,647)		2026
2027			5.00%	3,547,966		58,583	8,812,715	(516,770)	(1,211,417)		2027
2028			5.00%	3,547,966	335,377	59,755	8,853,097	1,211,417	0		2028
2029			5.00%	3,547,966	2,712,985	60,950	11,619,400	0	0		2029
2030			5.00%	3,547,966	3,904,152	62,169	13,174,286	0	0		2030
2031			5.00%	3,547,966	5,087,186	63,412	14,208,564	0	0		2031
2032			5.00%	3,547,966	4,410,788	64,680	14,358,434	0	0		2032
2033			5.00%	3,547,966	3,883,519	65,974	15,094,959	0	0		2033
2034			5.00%	3,547,966	4,893,724	67,293	15,831,484	0	0		2034
2035			5.00%	3,547,966	5,903,904	68,639	16,568,009	0	0		2035
2036			5.00%	3,547,966	6,914,056	70,012	17,304,534	0	0		2036
2037			5.00%	3,547,966	7,527,897	71,412	17,644,775	0	0		2037
2038			5.00%	3,547,966	7,544,311	72,841	18,167,617	0	0		2038
2039			5.00%	3,547,966	7,473,129	74,297	18,904,142	0	0		2039
2040			5.00%	3,547,966	12,480,668	75,783	19,640,667	0	0		2040
Total		2,000,000		56,767,451	73,071,695	1,364,949	241,487,394				Total

Notes:

Total Amount of Estimated Principal & Interest to Mt. Pleasant 85,168,938

Difference (12,097,242)

Projected TID Closure

Village of Yorkville

Tax Increment District #1

Cash Flow Projection - Assumed 30 Year Life

Year	Projected Revenues: Tax Increments	Special Assessments	Capitalized Interest	Other Revenue	Total Revenues	Expenditures: Phase I Costs Issuance 34,800,000 Dated Date: 07/19/19 Principal	Est. Rate	Interest	Phase II Costs Issuance 18,200,000 Dated Date: 07/19/23 Principal	Est. Rate	Interest
2019			5,858,000		5,858,000						
2020					0		5.00%	2,378,000			
2021	0	520,608			520,608		5.00%	1,740,000			
2022	818,361	1,107,264			1,925,625		5.00%	1,740,000			
2023	1,636,722	1,107,264	3,063,667		5,807,653	250,000	5.00%	1,733,750			
2024	2,455,083	1,107,264			3,562,348	250,000	5.00%	1,721,250		5.00%	1,243,667
2025	3,682,625	1,107,264			4,789,889	500,000	5.00%	1,702,500		5.00%	910,000
2026	5,237,511	1,107,264	1,801,167		8,145,942	1,500,000	5.00%	1,652,500		5.00%	910,000
2027	6,792,397	1,503,548			8,295,945	1,500,000	5.00%	1,577,500	500,000	5.00%	897,500
2028	8,347,284	1,717,231			10,064,514	1,500,000	5.00%	1,502,500	500,000	5.00%	872,500
2029	9,902,170	1,717,231			11,619,400	1,500,000	5.00%	1,427,500	1,000,000	5.00%	835,000
2030	11,457,056	1,717,231			13,174,286	1,500,000	5.00%	1,352,500	1,000,000	5.00%	785,000
2031	13,011,942	1,196,622			14,208,564	1,500,000	5.00%	1,277,500	1,000,000	5.00%	735,000
2032	13,748,467	609,967			14,358,434	2,000,000	5.00%	1,190,000	1,500,000	5.00%	672,500
2033	14,484,992	609,967			15,094,959	3,000,000	5.00%	1,065,000	1,500,000	5.00%	597,500
2034	15,221,517	609,967			15,831,484	3,000,000	5.00%	915,000	1,500,000	5.00%	522,500
2035	15,958,042	609,967			16,568,009	3,000,000	5.00%	765,000	1,500,000	5.00%	447,500
2036	16,694,567	609,967			17,304,534	3,000,000	5.00%	615,000	1,500,000	5.00%	372,500
2037	17,431,092	213,683			17,644,775	3,000,000	5.00%	465,000	1,500,000	5.00%	297,500
2038	18,167,617	0			18,167,617	3,600,000	5.00%	300,000	1,700,000	5.00%	217,500
2039	18,904,142	0			18,904,142	4,200,000	5.00%	105,000	1,750,000	5.00%	131,250
2040	19,640,667	0			19,640,667				1,750,000	5.00%	43,750
2041	19,640,667	0			19,640,667						
2042	19,640,667	0			19,640,667						
2043	19,640,667	0			19,640,667						
2044	19,640,667	0			19,640,667						
2045	19,640,667	0			19,640,667						
2046	19,640,667	0			19,640,667						
2047	19,640,667	0			19,640,667						
2048	19,640,667	0			19,640,667						
2049	19,640,667	0			19,640,667						
2050	19,640,667	0			19,640,667						
Total	409,998,925	17,172,307	10,722,833	0	437,894,065	34,800,000		25,225,500	18,200,000		10,491,167

Year	Phase II Costs Issuance 10,700,000 Dated Date: 07/19/26 Principal	Est. Rate	Interest	Sewer Capacity Lease 8,000,000 01/01/19 Total Annual Lease Pymt		Sewer Capacity 40,000,000 01/01/23 Total Annual Payment		Mount Pleasant Water/Sewer 48,858,600 Total Annual Payment	Admin.	Total Expenditures	Balances: Annual	Cumulative	Principal Outstanding	Year
2019				5.00%	400,000				50,000	450,000	5,408,000	5,408,000		2019
2020				5.00%	400,000				51,000	2,829,000	(2,829,000)	2,579,000		2020
2021				5.00%	400,000				52,020	2,192,020	(1,671,412)	907,588		2021
2022				5.00%	400,000				53,060	2,193,060	(267,435)	640,153		2022
2023				5.00%	400,000				54,122	2,437,872	3,369,781	4,009,935		2023
2024						5.00%	3,547,966		55,204	6,818,086	(3,255,739)	754,196		2024
2025						5.00%	3,547,966		56,308	6,716,774	(1,926,885)	(1,172,689)		2025
2026						5.00%	3,547,966		57,434	7,667,900	478,042	(694,647)		2026
2027		5.00%	731,167			5.00%	3,547,966		58,583	8,812,715	(516,770)	(1,211,417)		2027
2028		5.00%	535,000			5.00%	3,547,966	335,377	59,755	8,853,097	1,211,417	0		2028
2029		5.00%	535,000			5.00%	3,547,966	2,712,985	60,950	11,619,400	0	0		2029
2030	500,000	5.00%	522,500			5.00%	3,547,966	3,904,152	62,169	13,174,286	0	0		2030
2031	500,000	5.00%	497,500			5.00%	3,547,966	5,087,186	63,412	14,208,564	0	0		2031
2032	500,000	5.00%	472,500			5.00%	3,547,966	4,410,788	64,680	14,358,434	0	0		2032
2033	1,000,000	5.00%	435,000			5.00%	3,547,966	3,883,519	65,974	15,094,959	0	0		2033
2034	1,000,000	5.00%	385,000			5.00%	3,547,966	4,893,724	67,293	15,831,484	0	0		2034
2035	1,000,000	5.00%	335,000			5.00%	3,547,966	5,903,904	68,639	16,568,009	0	0		2035
2036	1,000,000	5.00%	285,000			5.00%	3,547,966	6,914,056	70,012	17,304,534	0	0		2036
2037	1,000,000	5.00%	235,000			5.00%	3,547,966	7,527,897	71,412	17,644,775	0	0		2037
2038	1,000,000	5.00%	185,000			5.00%	3,547,966	7,544,311	72,841	18,167,617	0	0		2038
2039	1,500,000	5.00%	122,500			5.00%	3,547,966	7,473,129	74,297	18,904,142	0	0		2039
2040	1,700,000	5.00%	42,500			5.00%	3,547,966	12,480,668	75,783	19,640,667	0	0		2040
2041								12,097,242	77,299	12,174,541	7,466,126	7,466,126		2041
2042										0	19,640,667	27,106,793		2042
2043										0	19,640,667	46,747,461		2043
2044										0	19,640,667	66,388,128		2044
2045										0	19,640,667	86,028,795		2045
2046										0	19,640,667	105,669,462		2046
2047										0	19,640,667	125,310,129		2047
2048										0	19,640,667	144,950,796		2048
2049										0	19,640,667	164,591,463		2049
2050										0	19,640,667	184,232,130		2050
Total	10,700,000		5,318,667		2,000,000		56,767,451	85,168,937	1,442,248	253,661,935				Total

Notes:

Total Amount of Estimated Principal & Interest to Mt. Pleasant 85,168,938

Difference (0)

Projected TID Closure

EHLERS
LEADERS IN PUBLIC FINANCE

Appendix C

Stand Alone Alternative Meeting Notes

- Participants:
  - Yorkville: Art Harrington & Stevin George (Godfrey & Kahn); Sherry Gruhn (Yorkville Supervisor); Gary Hanson (Yorkville Utility), Jon Cameron (Ehlers); Randy Sanford, Dan Schaefer (SEH);
  - DNR: Jim Zellmer, Cathy Wunderlich; Shaili Pfeifer; Adam Freihoefer, Bryan Hartsook
  - Racine: Jonathon Delegrave (Racine County Executive); Jordan Brown, in place of Jennie Trick (RCEDC); Julie Anderson (Racine County); Michael Lanzdorf (Racine County Corporation Counsel); Jerry Franke (Franke Dev. Advisors, consultant for County)
  - SEWRPC: Mike Hahn, Laura Herrick
- Overview of Meeting
  - After introductions, Art gave an overview of the meeting agenda accompanied by introductory statements. As framed, the purpose of the meeting was to discuss the need for water/sewer services west of I-94 to obtain maximum advantage of a $3 billion public investment in Racine County. By the end of the meeting, Yorkville wished to be able to provide assurance to prospective developers that Yorkville has a plan for sewer/water service that will meet DNR requirements. The Yorkville sewer/water plan, as framed was two-pronged: 1) supporting anticipating development demands during the next 5-10 years on the Yorkville side of I-94, and 2) determining whether DNR approval is feasibility within a reasonable time period for the Utility needs.
  - Following Art's overview, County Executive Delegrave and Supervisor Gruhn explained the importance of development on both sides of I-94 in Racine County; such development would help create an economic base. Following this, Jordan Brown gave an overview of development opportunities and related timelines for growth west of I-94 and the connection between this and Yorkville water/wastewater needs.
  - For the historical perspective piece, Gary Hanson described the recent history of Yorkville Water/Wastewater; Art discussed Yorkville's negotiations with Racine, Racine Utility, and Mt. Pleasant for pursuit of Racine's water/wastewater option; and Jon Cameron, using numerous spreadsheets that were shared with the meeting attendees, discussed the cost implications of pursuing "the Racine option." Cathy Wunderlich (DNR) asked Yorkville attendees whether, during the discussions with Racine, the PSC was brought in, as it has regulatory power to mandate certain outcomes with regards to water/wastewater needs; Art replied that while there was contact with the PSC, Yorkville largely pursued negotiations with Racine of its own accord.
  - Following the discussion of cost implications, Randy Sanford and others discussed the proposed sewer/water service area for Utility needs, highlighting the details of the 2035 Comprehensive Plan.
  - Gary Hanson provided an overview of Yorkville's Wastewater Facility, and Dan Schaefer following up by discussing proposed facility upgrades to address the NOV and meet Utility needs. Soon after, Gary Hanson and Randy Sanford discussed the current water facility, as well as the use of a proposed backup well for Utility needs.
  - Adam Freihoefer (DNR) discussed some of the requirements for high capacity wells, emphasizing that the process for applying for a high capacity well in Southeast WI would only raise the concern of

interfacing with existing high capacity well. At this juncture, Shaili Pfeifer(DNR) asked Yorkville whether it had considered the economic cons of pursuing this 'stand-alone' option. Dan Schaefer answered that going with the Racine option was still costlier than going to the existing site, and that going with the Racine option would have triggered an MDV issue.

  - Cathy Wunderlich (DNR) stated having a 'backup well' was not a problem, the only issue would be with 'right-sizing it.' In order to do this, Yorkville needed to go through a preapproval process with DNR and the PSC to discuss/resolve any obstacles of concern. Gary Hanson asked whether it would be used to start with this application and then get PSC involved. Cathy answered that it might be better to do the application in concert with both agencies, given that PSC tends to take longer than DNR for feedback. Gary then discussed how, for the purposes of easing any high cap well application, Yorkville had decided to not serve residents; the DNR noted the strategy, commenting that a decision to serve residents would trigger certain requirements, such as those found in NR 811.
  - Bryan Hartsook (DNR) discussed the NOV and related concerns, particularly with regards to phosphorous limits and source reduction measures (SRMs) for the chloride exceedances. At this juncture, Julie Anderson (Racine County) clarified Racine's role in the exceedances identified in the NOV. Dan Schaefer asked DNR to comment on whether any exceedances/increases would affect the timeline for permit issuance. Bryan Hartsook responded that the department calculates limits based on initial design flow, but that it could later perform a design modification to the design flow.
  - Mike Hahn discussed SEWRPC's role regarding the first edition sewer service area plan, emphasizing that SEWRPC would look at environmental load and that Yorkville could prepare its engineering report in anticipation of meeting with SEWRPC. Mike Hahn mentioned that one possible date for a Yorkville-SEWRPC meeting could be July 24, which his date of a public hearing. Yorkville stated it would have a draft amendment to the regional water quality plan, which could include having supporting information to make a case for cost effectiveness for capital costs and other operational costs.
- Action Steps
  - Yorkville, as early as possible, should pursue a joint-meeting with the PSC and DNR (by emailing Cathy Wunderlich, DNR) regarding the preapproval process to discuss/resolve any possible obstacles of concern regarding creating the backup well.
  - Yorkville, as early as possible, should send an engineering report to Bryan Hartsook (DNR) after talking with SEWRPC and making sure any concerns regarding a first edition sewer service area plan have been ironed out.
  - Art will follow up with Michael Lanzdorf (Racine County Corporation Counsel) regarding Racine County commitment to help with the financial costs of the Yorkville 'stand-alone' option, particularly in the wake of a statement by County Executive Jonathon Delegrave regarding the County's support for Yorkville's current plan.

Yorkville/DNR Meeting
10 a.m. to Noon, March 20, 2018
Ives Grove Racine County Office Complex, Yorkville, Wisconsin.

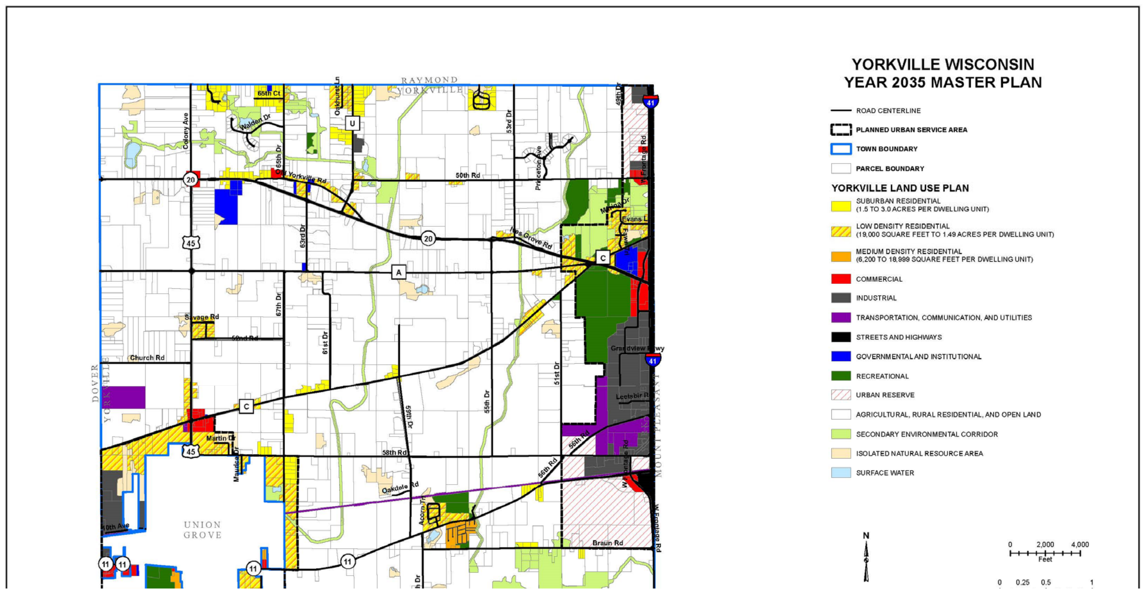
- **Introductions**
- **I-94 Development Demand for Water/Sewer**
- **Overview of Cost/Benefit Analysis for Yorkville/Racine Regional Option**
- **Yorkville Wastewater Preferred Option**
    - **Compliance Status**
    - **Proposed Service Area**
    - **Facility Planning**
- **Yorkville Water Preferred Option**
    - **Existing Service Constraints**
    - **Proposed Service Area**
    - **Water Supply & Distribution Planning**
- **DNR Input on Yorkville Sewer and Water Options**
    - **Overview of regulatory approvals**
    - **Timelines**
- **Path Forward**

18638001.1

Yorkville Sewer Utility District No. 1

Water and Wastewater Planning

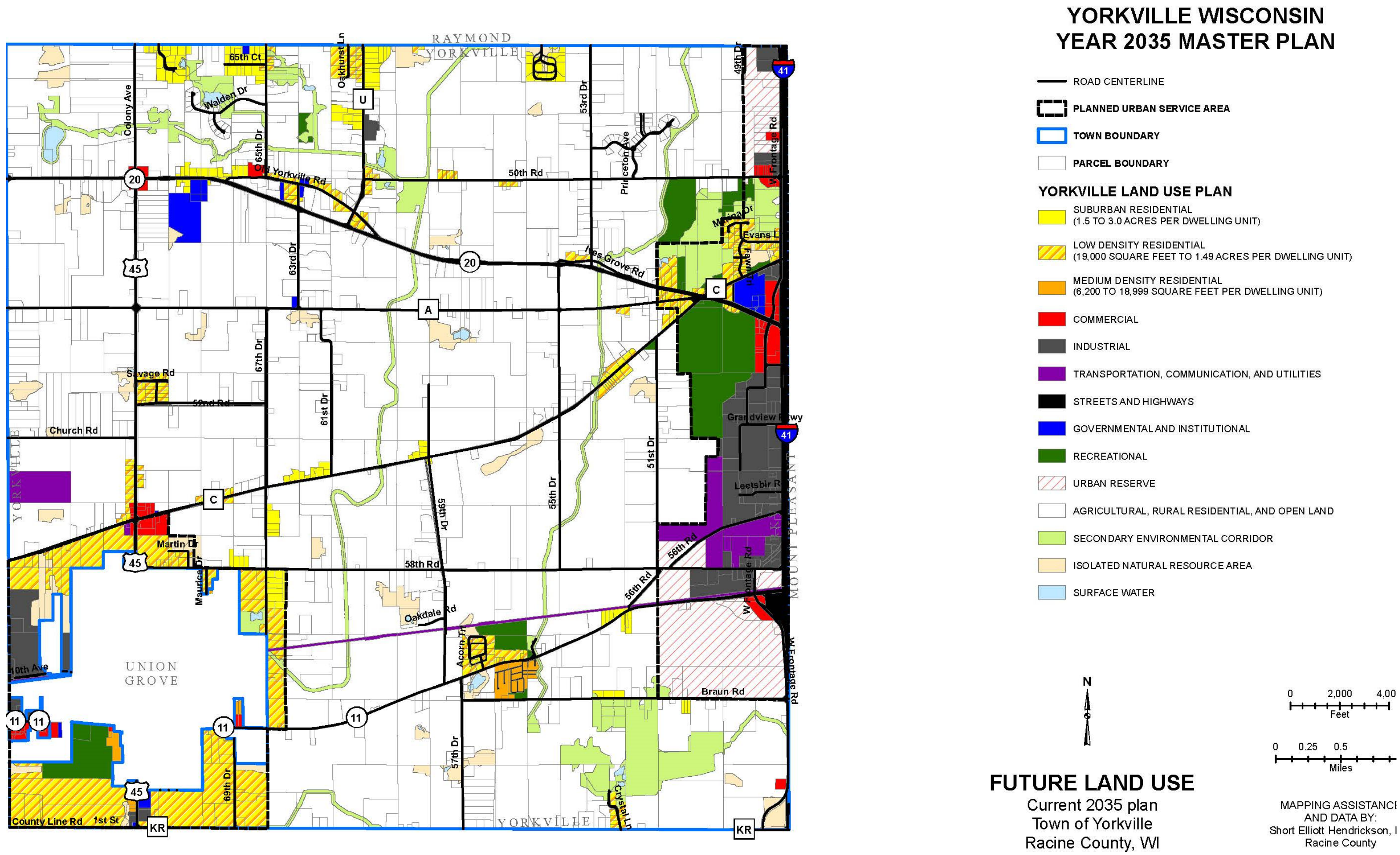
March 20, 2018



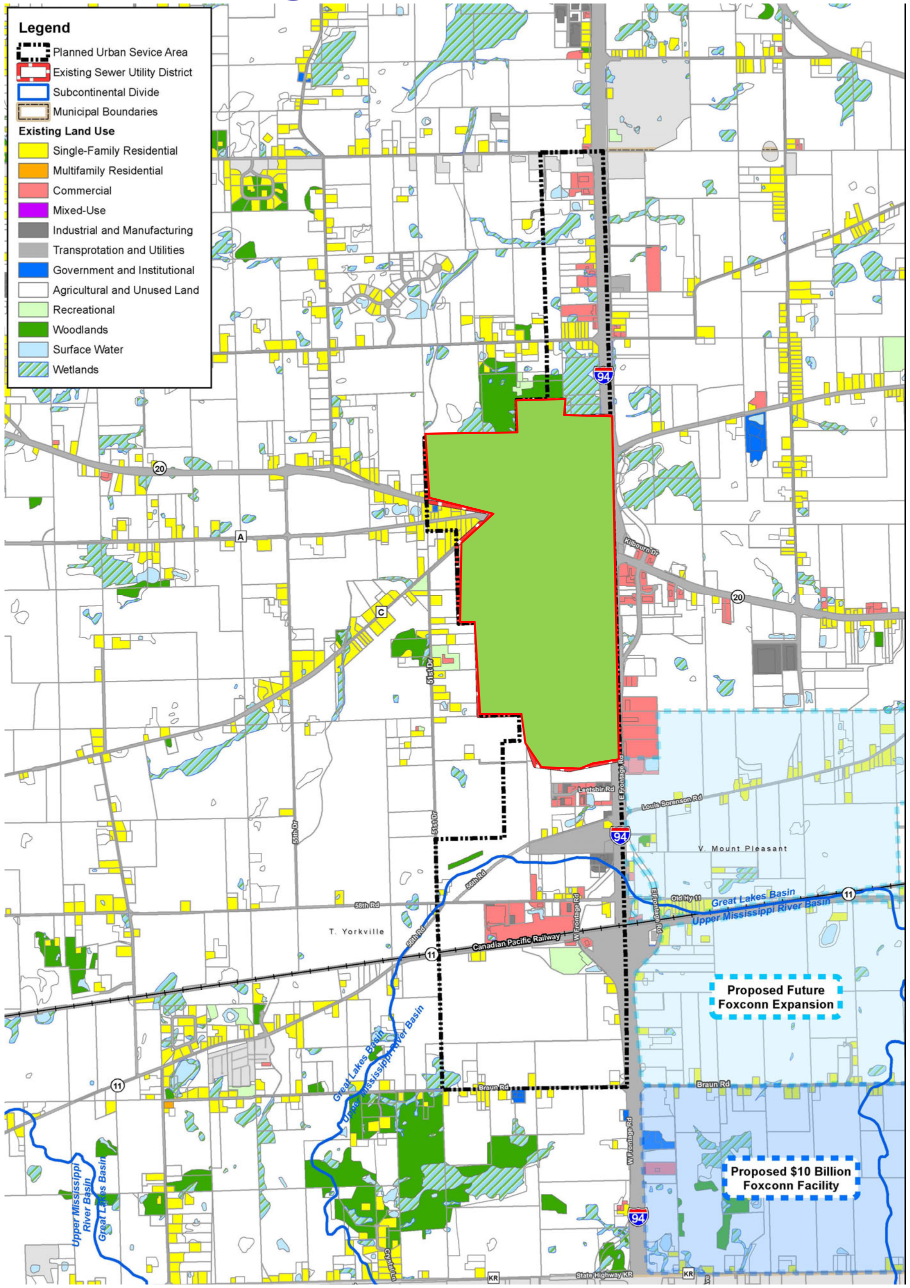
Status Update Outline

- Existing 2035 Comprehensive Plan
- Wastewater Needs
- Water System Needs
- Timelines

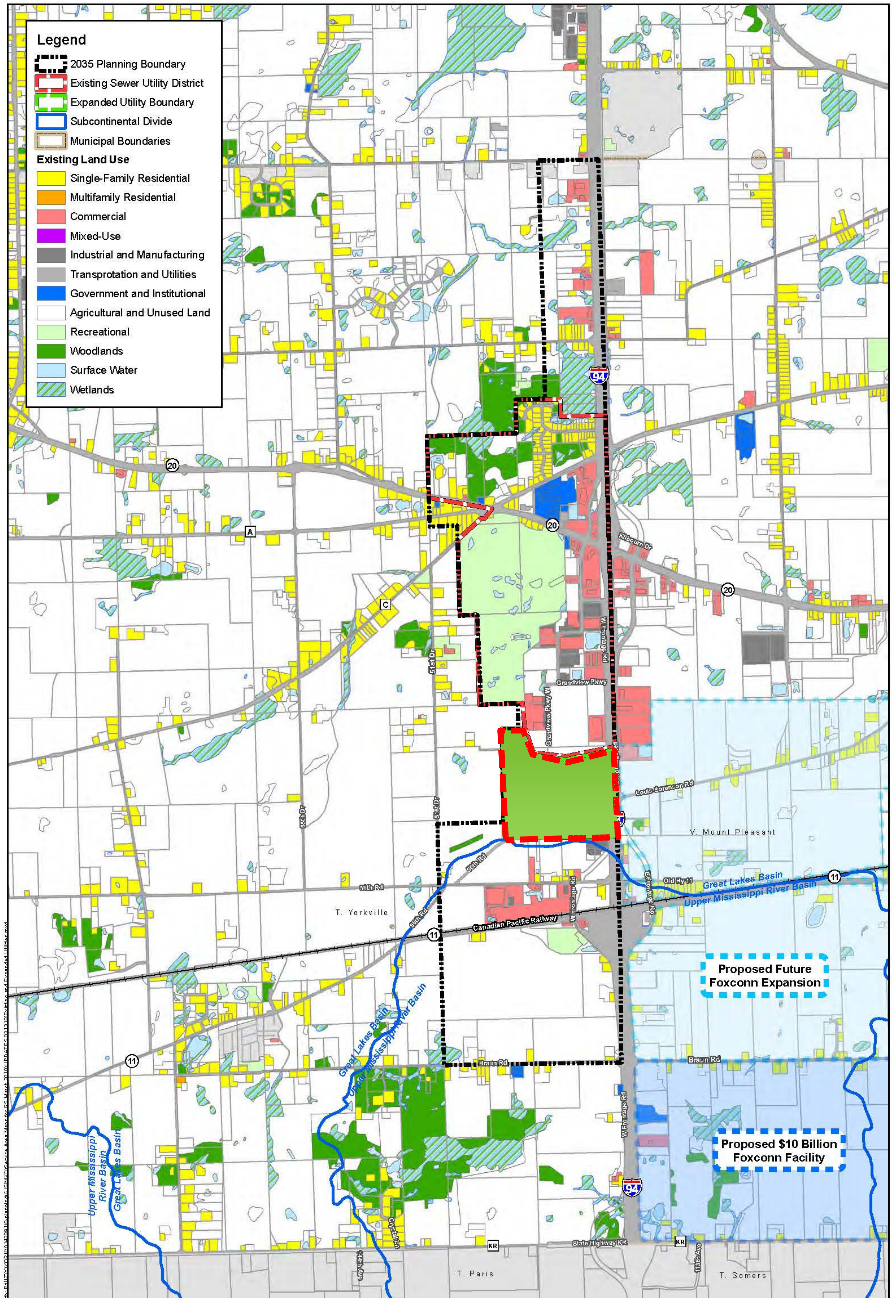
Existing 2035 Comprehensive Plan



Existing Sanitary Sewer Service Area



Proposed Wastewater Service Area



EXISTING AND EXPANDED UTILITIES BOUNDARY; 2035 COMPREHENSIVE PLANNING BOUNDARY

Town of Yorkville, Racine County, Wisconsin

0 1,250 2,500 Ft

Map by: mfalk
Projection: State Plane Wisconsin South FIPS 4803
Source: Racine County
Print Date: 3/15/2018

SEH
6808 ODANA RD
SUITE 200
MADISON, WI 53719
TF: (608) 620-6199
FAX: (888) 908-8166
www.sehinc.com

Wastewater Facility Planning

- Alternatives for NOV Compliance & Short Term Proposed Service Area
  - NOV Compliance
  - Increased Flows & Loadings to Serve Short Term Service Area (Existing + Current Comp Plan)

NOV Compliance

- BOD

BOD5 Exceedances			
Date	*Result Amount*	*Description*	*Limit Amount*
01/03/2016	67.1 mg/L	Monthly Avg.	20 mg/L
01/03/2016	51 mg/L	Weekly Average Limit	30 mg/L
01/11/2016	39 mg/L		30 mg/L
01/17/2016	63 mg/L		30 mg/L
01/25/2016	115.3 mg/L		30 mg/L
04/04/2016	22.1 mg/L	Monthly Avg.	20 mg/L
05/01/2016	31.5 mg/L	Weekly Average Limit	30 mg/L
07/24/2017	*93.7 mg/L		30 mg/L

  - 8 Exceedances from January 2016 to July 2017
  - Primarily winter conditions

NOV Compliance

- Ammonia
  - 22 Exceedances from Feb 2014 to Jan 2017
  - Original construction designed for BOD removal only
  - Ammonia limits were subsequently added to a future permit
  - Although WWTP operates at approximately 50% of flow capacity, WWTP struggles to nitrify in winter
  - Primarily due to design of original WWTP with no RAS pumping or WAS control

SEH

NOV Compliance

- TSS
  - Existing final clarifier shares a common wall with aeration tank and has ports located at the bottom to convey RAS back to aeration tank
  - No means to control sludge blanket via RAS Pumping
- Chlorides
  - Submitting SRM focusing on Racine County Improvements and further sampling

SEH

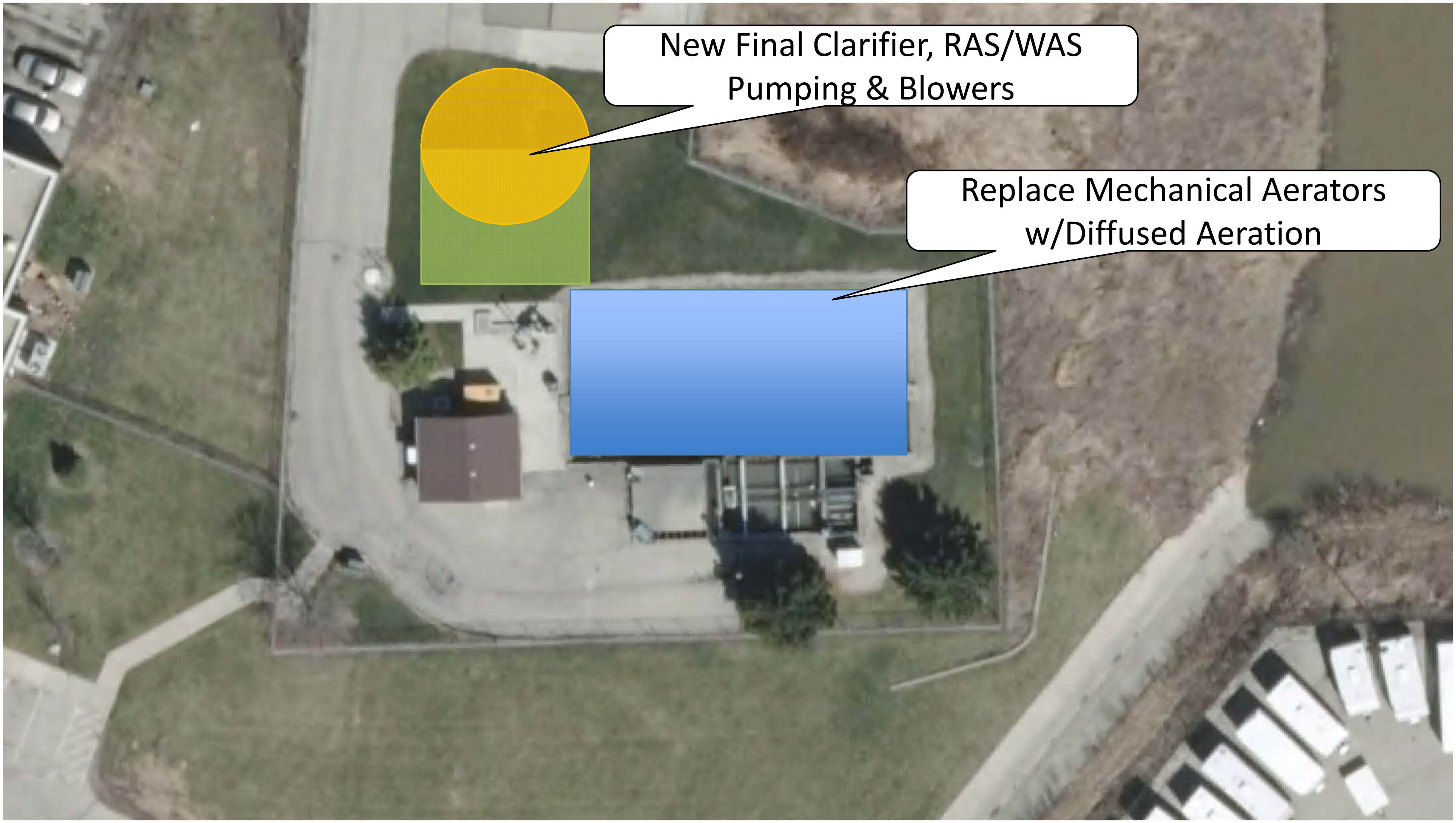
Short Term Increased Flows & Loadings

- Increased Capacity Required to serve existing service area & current Comprehensive Plan Area
- Preliminary Flow Design Basis:
  - Average Annual – 0.235 MGD
  - Peak Day – 0.635 MGD

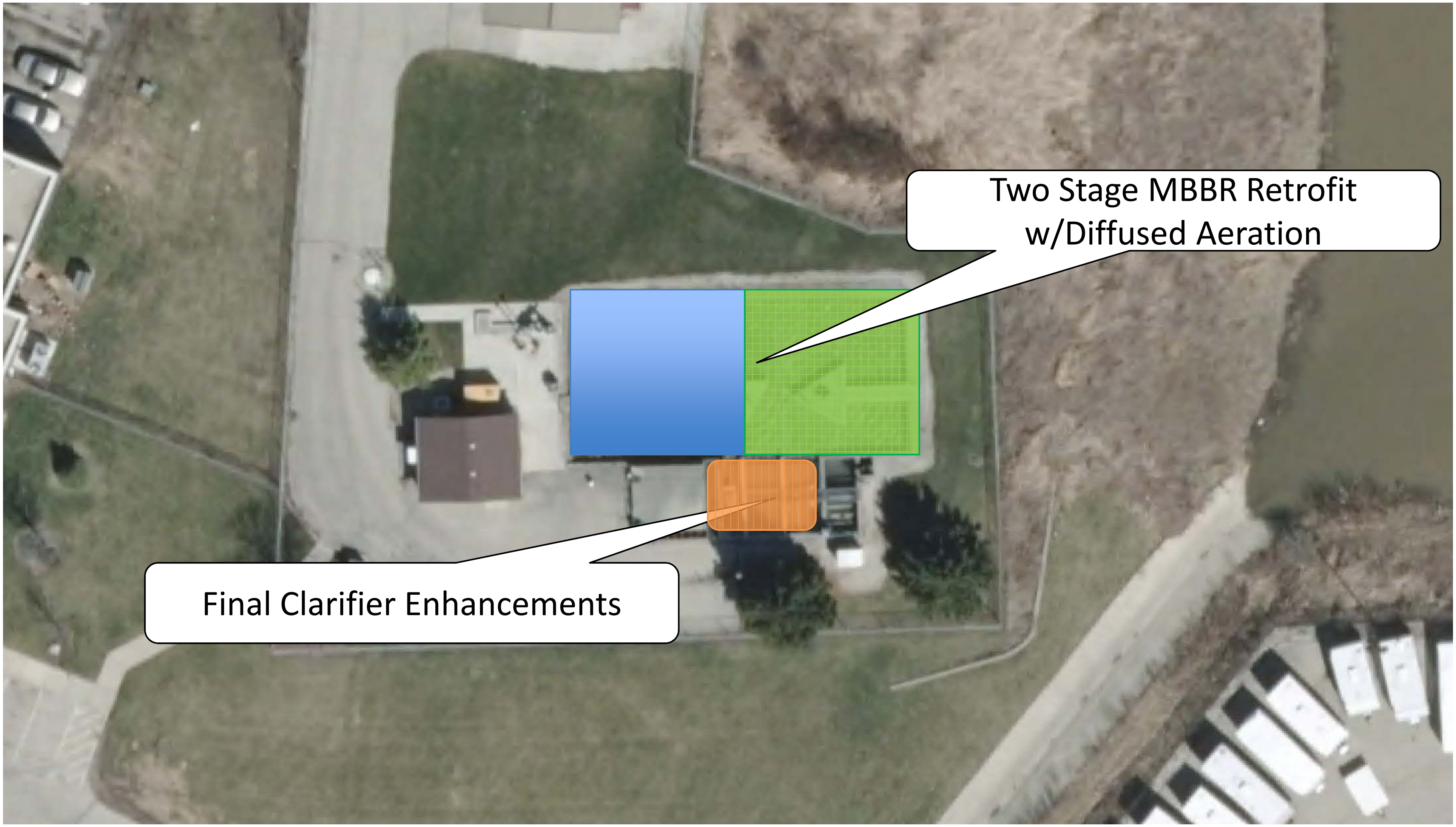
Alternatives for NOV Compliance & Short Term Planning Area

- Construct New Final Clarifier w/Return Activated Sludge (RAS) & Waste Activated Sludge (WAS) Pumping, New Blowers & Diffused Aeration
- Moving Bed Biofilm Reactor (MBBR) Retrofit
- Primary Microscreening
- Construct Sequencing Batch Reactor (SBR)

New Final Clarifier, Pumping & Aeration Upgrades



MBBR Retrofit & Clarifier Enhancements

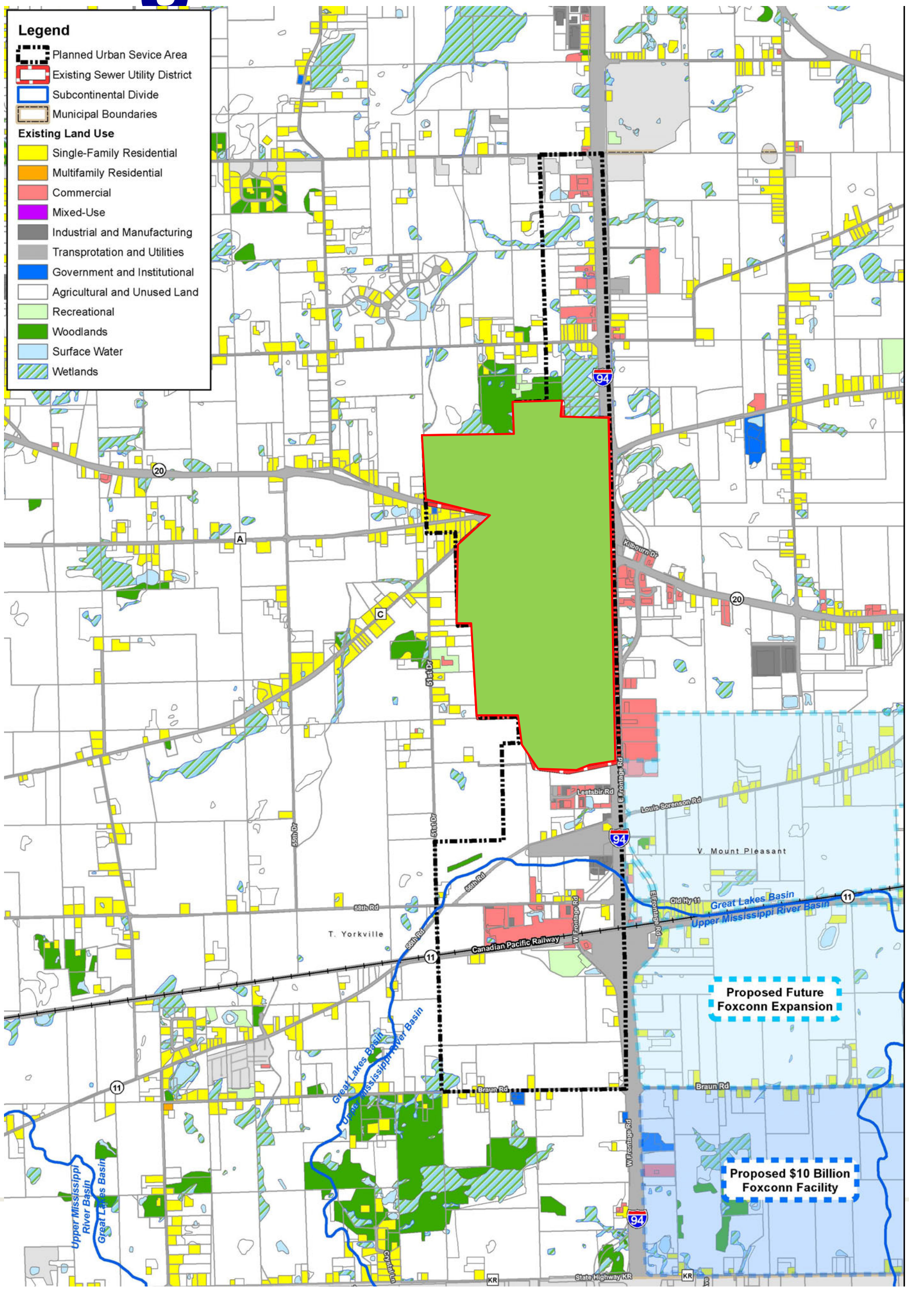


SEH

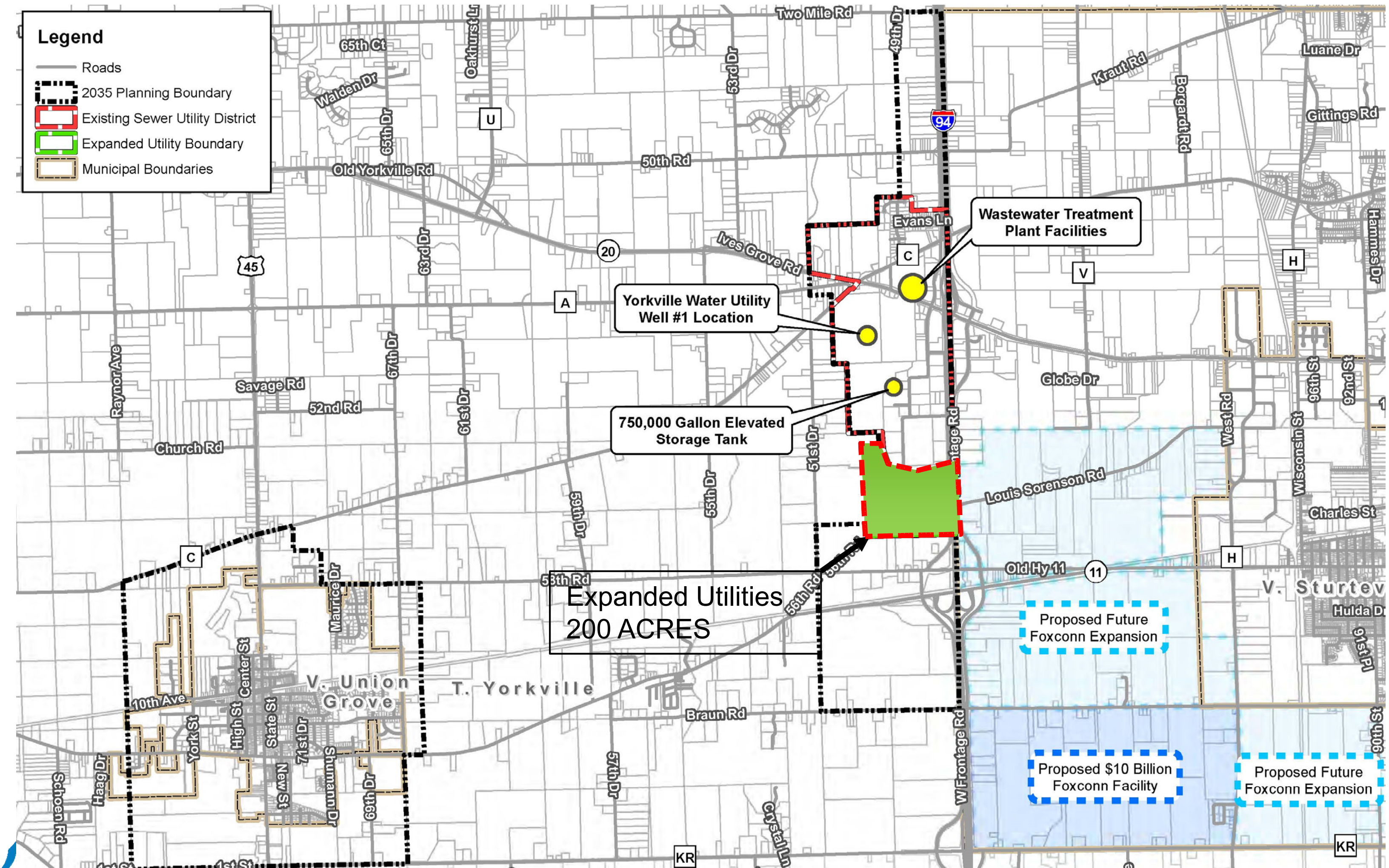
SBR Upgrade


New SBR & Blower/Control Building
Convert Existing Aeration Basin to Equalization & Sludge Storage

Existing Water Service Area



Expanded Water Service Area



SEH

Expanded Water Service Area

Table 3 - Water Needs Projection of Great Lakes Watershed

Land Use	Area (acres)[1]	Unit Demand (gpd/acre)	Average Day Demand (mgd)	MD:AD Ratio[6]	Maximum Day Demand (mgd)
Proposed Expanded Commercial and Light	200	1,100	0.22		0.29
Existing Grandview Technology Park	950	650	0.62		0.80
Mixed-Use		0			
Residential Portion	0	*0*	*0.00*		0.00
Commercial Portion		*0*	*0.00*	1.3	0.00
Residential	0	0	0.00		0.00
Subtotal	*1,150*		*0.84*		*1.09*
Public Authority Water Use		*5%*	*0.00*		*0.00*
Water Loss		*12%*	*0.00*		*0.00*
Total with Town of Yorkville			**0.8**	1.3	**1.1**

Table 4 - Water Needs Projection of Mississippi River Watershed

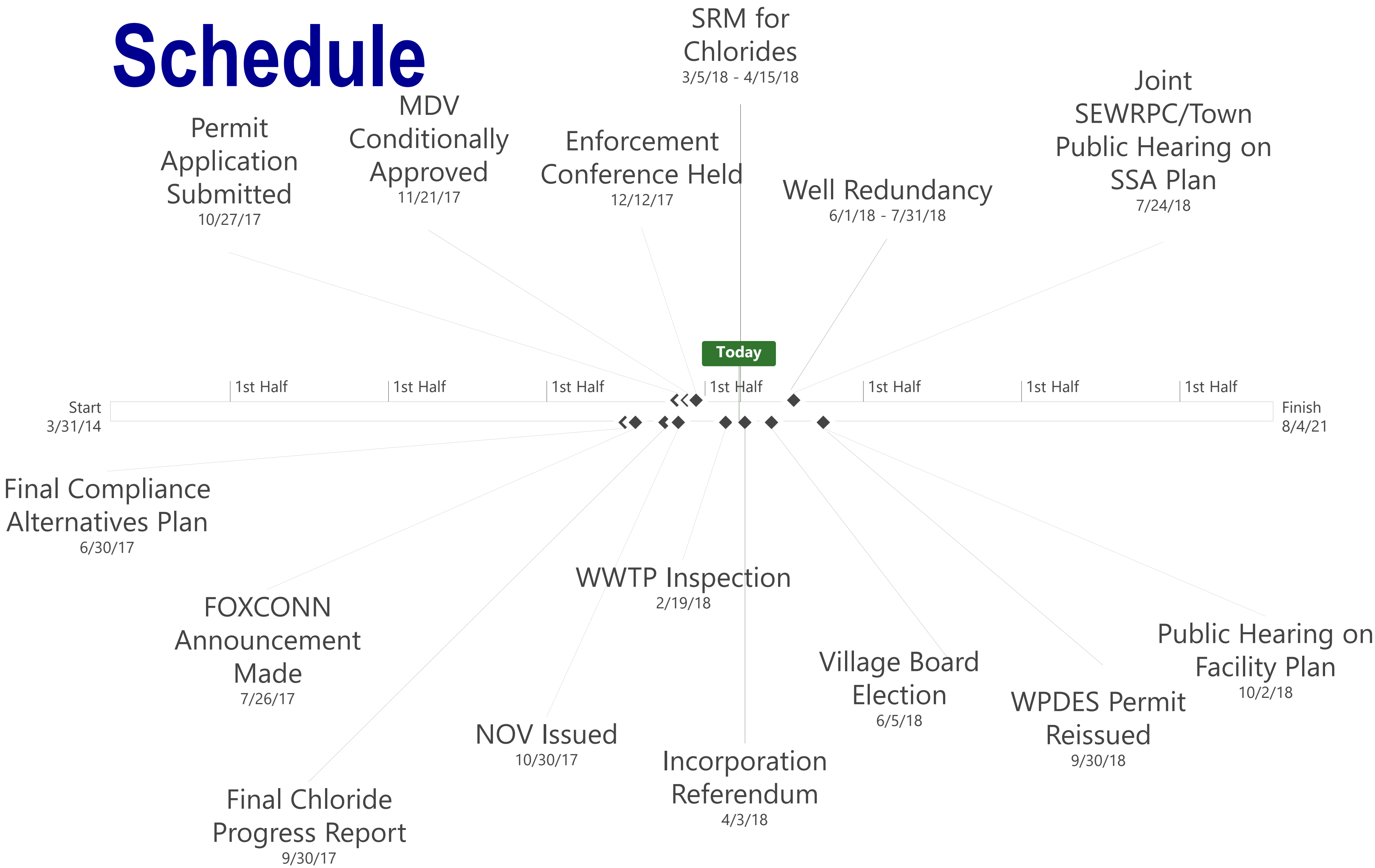
Land Use	Area (acres)[1]	Unit Demand (gpd/acre)	Average Day Demand (mgd)	MD:AD Ratio[6]	Maximum Day Demand (mgd)
Commercial and Light Industrial[3]	0	1,100	0.00		0.00
Grandview Technology Park[3]	0	650	0.00		0.00
Mixed-Use		0			
Residential Portion[4,6]	0	*0*	*0.00*		0.00
Commercial Portion[5]		*0*	*0.00*		0.00
Residential[4,6]	0	0	0.00	2.0	0.00
Area 2 - "Smart City"[4,6]	0	#DIV/0!	#DIV/0!		#DIV/0!
Subtotal	*0*		*#DIV/0!*		*#DIV/0!*
Public Authority Water Use		*5%*	*#DIV/0!*		*#DIV/0!*
Water Loss		*12%*	*#DIV/0!*		*#DIV/0!*
Total			**#DIV/0!**		**#DIV/0!**

Existing Well #1

Existing 750,000 Gallon Spheroid Tank

Proposed Redundant Well

Schedule



SRM for Chlorides
3/5/18 - 4/15/18
Permit Application Submitted
10/27/17
MDV Conditionally Approved
11/21/17
Enforcement Conference Held
12/12/17
Well Redundancy
6/1/18 - 7/31/18
Joint SEWRPC/Town Public Hearing on SSA Plan
7/24/18
Today
1st Half
1st Half
1st Half
1st Half
1st Half
1st Half
1st Half
Start
3/31/14
Finish
8/4/21
Final Compliance Alternatives Plan
6/30/17
FOXCONN Announcement Made
7/26/17
WWTP Inspection
2/19/18
Public Hearing on Facility Plan
10/2/18
Village Board Election
6/5/18
WPDES Permit Reissued
9/30/18
NOV Issued
10/30/17
Incorporation Referendum
4/3/18
Final Chloride Progress Report
9/30/17

Appendix D

WPDES Permit

WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

Yorkville Sewer Utility District No. 1

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
14100 Washington Avenue, Sturtevant, WI 53177
to
Ives Grove Ditch to Hoods Creek (Root River Watershed, Root/Pike River Basin) in Racine County

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By Bryan Hartsook
Bryan Hartsook
Wastewater Field Supervisor

9/30/19
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE – October 1, 2019 **EXPIRATION DATE - September 30, 2024**

TABLE OF CONTENTS

1 Influent Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
701	INFLUENT: Composite samples shall be collected from influent channel after 1\4" bar screen.

1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

1.2.1 Sampling Point 701 - INFLUENT TO PLANT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
BOD_5, Total		mg/L	3/Week	Composite	
Suspended Solids, Total		mg/L	3/Week	Composite	

2 Surface Water Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
001	EFFLUENT: 24-hr flow proportional composite samples shall be collected after the clarifier prior to the old chlorine contact tank. Grab samples shall be collected after final effluent weir.

2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point (Outfall) 001 - EFFLUENT

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD_5, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD_5, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	5/Week	Grab	
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	Calculated	Report the calculated variable Ammonia limit on the DMR year round. See Maximum Ammonia limits table in section 2.2.1.2.
Nitrogen, Ammonia (NH_3-N) Total	Daily Max - Variable	mg/L	2/Week	24-Hr Flow Prop Comp	Report Ammonia effluent value on the DMR year round.
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	29 mg/L	2/Week	24-Hr Flow Prop Comp	Effective May - October
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	5.1 mg/L	2/Week	24-Hr Flow Prop Comp	Effective November - April
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	12.4 mg/L	2/Week	24-Hr Flow Prop Comp	Effective May - October
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	2.2 mg/L	2/Week	24-Hr Flow Prop Comp	Effective November - April

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total	Monthly Avg	1.0 mg/L	2/Week	24-Hr Flow Prop Comp	This is an interim MDV limit effective through June 30, 2021. See the MDV/Phosphorus and schedules section of the permit.
Phosphorus, Total	Monthly Avg	0.8 mg/L	2/Week	24-Hr Flow Prop Comp	This is an interim MDV limit effective on July 1, 2021. See the MDV/Phosphorus and schedules section of the permit.
Phosphorus, Total		lbs/month	Monthly	Calculated	Report the total monthly phosphorus discharged in lbs/month on the last day of the month on the DMR. See section 5.4.2 of the permit for 'Appropriate Formulas' to calculate the Total Monthly Discharge in lbs/month.
Phosphorus, Total		lbs/yr	Annual	Calculated	Report the sum of the total monthly discharge load for the calendar year on the Annual Report form.
Chloride	Daily Max	1,400 mg/L	4/Month	24-Hr Flow Prop Comp	This is an interim limit. Sampling shall be conducted on four consecutive days each month. See Chloride Variance section below and the Schedules section for applicable chloride target value.
Chloride	Weekly Avg	450 mg/L	4/Month	24-Hr Flow Prop Comp	This is an interim limit. Effective May - November. Sampling shall be conducted on four consecutive days each month. See Chloride Variance section below and the Schedules section for applicable chloride target value.

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Chloride	Weekly Avg	710 mg/L	4/Month	24-Hr Flow Prop Comp	This is an interim limit. Effective December - April. Sampling shall be conducted on four consecutive days each month. See Chloride Variance section below and the Schedules section for applicable chloride target value.
Chloride		lbs/day	4/Month	Calculated	Chloride Mass = daily concentration (mg/L) x daily flow (MGD) x 8.34
Zinc, Total Recoverable		µg/L	Monthly	24-Hr Flow Prop Comp	Monitoring for zinc required only in calendar year 2023.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See WET section below.
Chronic WET		TU_c	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See WET section below.

2.2.1.1 Annual Average Design Flow

The annual average design flow of the permittee's wastewater treatment facility is 0.150 MGD.

2.2.1.2 Daily Maximum Ammonia Limits

The daily maximum limits for ammonia correspond to the daily pH value, in accordance with the following table:

Effluent pH (s.u.)	NH_3-N Limit (mg/L)	Effluent pH (s.u.)	NH_3-N Limit (mg/L)	Effluent pH (s.u.)	NH_3-N Limit (mg/L)
$6.0 < pH \le 6.1$	55	$7.0 < pH \le 7.1$	36	$8.0 < pH \le 8.1$	8.4
$6.1 < pH \le 6.2$	54	$7.1 < pH \le 7.2$	33	$8.1 < pH \le 8.2$	6.9
$6.2 < pH \le 6.3$	53	$7.2 < pH \le 7.3$	30	$8.2 < pH \le 8.3$	5.7
$6.3 < pH \le 6.4$	52	$7.3 < pH \le 7.4$	26	$8.3 < pH \le 8.4$	4.7
$6.4 < pH \le 6.5$	51	$7.4 < pH \le 7.5$	23	$8.4 < pH \le 8.5$	3.9
$6.5 < pH \le 6.6$	49	$7.5 < pH \le 7.6$	20	$8.5 < pH \le 8.6$	3.2
$6.6 < pH \le 6.7$	47	$7.6 < pH \le 7.7$	17	$8.6 < pH \le 8.7$	2.7
$6.7 < pH \le 6.8$	45	$7.7 < pH \le 7.8$	14	$8.7 < pH \le 8.8$	2.2
$6.8 < pH \le 6.9$	42	$7.8 < pH \le 7.9$	12	$8.8 < pH \le 8.9$	1.8
$6.9 < pH \le 7.0$	39	$7.9 < pH \le 8.0$	10	$8.9 < pH \le 9.0$	1.6

2.2.1.3 MDV (Multi-Discharger Variance) Requirements

Optimization: The permittee shall continue to optimize performance to control phosphorus discharges in accordance with s. 283.16(6), Wis. Stats. See the Schedules section for optimization requirements.

Watershed Provisions: The permittee is required to implement watershed measures to reduce the amount of phosphorus entering the receiving water. The permittee has selected the following approved watershed measure.

Payment to County for Phosphorus Reduction: The permittee shall make payments for phosphorus reduction to the county or counties approved by the Department per s. 283.16(8), Wis. Stats. The permittee shall make a total payment by March 1 of each year in the amount equal to the per pound amount of $53.01 times the number of pounds by which the effluent phosphorus discharged during the previous year exceeded the permittee's target value or $640,000, whichever is less. The target value is 0.2 mg/L per s. 283.16(1)(h), Wis. Stats., and is applicable during the months that the MDV is in effect. The MDV is in effect year-round Refer to the Schedules section for the scheduled annual requirements.

Annual Payment Calculation: The annual payment is equal to the phosphorus load that exceeds the target value multiplied by **$53.01** per pound. Use the steps shown below to calculate the annual payment. In addition, the Department shall send a statement to the permittee specifying total payment due to the participating counties each year in accordance with the Schedules section.

Annual Payment = [Annual Phosphorus Load – Annual Target Load] × Price Per Pound
Calculation Steps:

1. Calculate pounds of phosphorus discharged for each month that the MDV is in effect:

   Monthly Phosphorus Load (lbs/month) = Total Monthly Flow (MG) × Monthly Avg. TP effluent conc. (mg/L) × 8.34

2. Sum the pounds per month for each month that the MDV is in effect to calculate the Annual Phosphorus Load:

   Annual Phosphorus Load (lbs/year) = ∑ [Monthly Phosphorus Load (lbs/month)]

3. Calculate the Target Load (lbs/month) for each month that the MDV is in effect:

   Target Value = 0.2 mg/L:
   Monthly Target Load (lbs/month) = Total Monthly Flow (MG) × 0.2 mg/L × 8.34

4. Sum the pounds per month for the months that the MDV is in effect to calculate the Annual Target Load:

   Annual Target Load (lbs/year) = ∑ [Monthly Target Load (lbs/month)]

5. Calculate the Annual Payment:

   Annual Payment = [Annual Phosphorus Load – Annual Target Load] × Price Per Pound

2.2.1.4 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Ives Grove Ditch

A synthetic (standard) laboratory control water may be used due to potential lack of baseflow in the receiving water

Instream Waste Concentration (IWC): 100%

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.
- **Chronic:** 100, 75, 50, 25, 12.5% and any additional selected by the permittee.

WET Testing Frequency:

Acute tests shall be conducted every year, in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Acute:** January – March 2020; April – June 2021; July – September 2022; October – December 2023; January – March 2024

Acute WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in October – December 2024.

Chronic tests shall be conducted every year, in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Chronic:** January – March 2020; April – June 2021; July – September 2022; October – December 2023; January – March 2024

Chronic WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in October – December 2024.

Testing: WET testing shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during WET tests.

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The Discharge Monitoring Report (DMR) form shall be submitted electronically by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: $TU_a = 100 \div LC_{50}$. A chronic toxicity test shall be considered positive if the Toxic Unit - Chronic (TU_c) is greater than 1.0 for either species. The TU_c shall be calculated as follows: $TU_c = 100 \div IC_{25}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The 90 day reporting period shall begin the day after the test which showed a positive result. The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

2.2.1.5 Chloride Variance – Implement Source Reduction Measures

This permit contains a variance to the water quality-based effluent limit (WQBEL) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code. As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitation specified in the table above, (b) implement the chloride source reduction measures specified below, (c) follow the approved Source Reduction Plan and (d) perform the actions listed in the schedule. (See the Schedules section herein.):

1. Educate softener owners on the impact of chloride on water quality; provide information about increasing softener efficiency and reducing the use of softened water.
2. Develop an ordinance requiring the inspection of water softener equipment at time of sale of or transfer of real estate and construction of a new home building.
3. Offer to Utility users a purchase incentive to upgrade existing water softeners.

4. For existing softeners, the Utility will conduct a residential softener tune-up program, which involves a qualified servicing to ensure proper control settings and adjustments.
5. Develop and refine a mass balance for chloride sample data.
6. Analyze industrial and commercial contributors to prevent increases in the amount of chloride discharged and seek reductions from those sources.
7. Mandate through ordinance that chloride loading from industrial sources does not exceed the effluent limit of the WWTF.
8. Continue complying with CMOM practices and specifically regarding manhole inspection, sewer cleaning, and repairs. All manholes will be inspected once every 5 years.
9. Continue working with the Racine County Highway Department (RCHD) specifically regarding conformance with local chloride limits.
    a. Utility will conduct meeting with the RCHD as to the status of improvement to the Highway Dept. Campus inspections. Establish a schedule for the implementation of source reduction measures to be implemented.
    b. Implement source reduction measures identified. After source reduction measures are implemented, collect and analyze samples and provide a report of chloride loadings. Track compliance with the ordinance and implementation of the source reduction measures. Provide a summary report and data trends.

3 Land Application Requirements

3.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
003	Aerobically digested sludge collected once annually prior to hauling and test results reported on Form 3400-49 - Waste Characteristics Report. Form 3400-52 - Other Methods of Disposal or Distribution Report is required following each year sludge is hauled.

3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 003 - Hauled Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Annual**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Annual**

3.2.1.1 Applicability of Limits and Sludge Land Application

As long as sludge is hauled to another permitted facility as the sole disposal method the metals limits in the table above do not apply and monitoring may remain at Annual. If the permittee plans to land apply sludge during the permit term the permittee must notify the Department at least 180 days prior to land application and the permit shall be modified to include the appropriate land application requirements.

4 Schedules

4.1 Facility Modifications - Ammonia Removal & Phosphorus MDV Interim Limit 0.8 mg/L

This compliance schedule requires the permittee to complete facility modifications necessary for improved ammonia nitrogen removal and achieving compliance with the Multi-Discharger Variance (MDV) interim effluent limit of 0.8 mg/L in accordance with s. 283.16(6), Wis. Stats., by the due date.

Required Action	Due Date
Plans and Specifications: Submit plans and specifications for treatment facility modifications as needed to improve ammonia nitrogen removal and to comply with the interim MDV phosphorus limit by 07/01/2021.	03/31/2020
Initiate Actions: Initiate actions identified in the action plan or facility plan amendment.	06/30/2020
Progress Report: Submit a progress report summarizing actions taken to date.	12/31/2020
Complete Actions: Complete actions necessary to improve ammonia nitrogen removal and to achieve compliance with the interim MDV phosphorus limit. The Interim MDV phosphorus limit of 0.8 mg/L expressed as a monthly average goes into effect 07/01/2021.	06/30/2021
Progress Report #1: Submit a progress report on effluent discharges of total ammonia nitrogen with conclusions regarding compliance and continued optimization of phosphorus removal by the Due Date.	06/30/2022
Progress Report #2: Submit a progress report on effluent discharges of total ammonia nitrogen with conclusions regarding compliance and continued optimization of phosphorus removal by the Due Date.	06/30/2023

4.2 Phosphorus Payment per Pound to County

The permittee is required to make annual payments for phosphorus reductions to the participating county or counties in accordance with s. 283.16(8), Wis. Stats, and the following schedule. The price per pound will be set at the time of permit reissuance and will apply for the duration of the permit.

Required Action	Due Date
Annual Verification of Phosphorus Payment to County: The permittee shall make a total payment to the participating county or counties approved by the Department by March 1 of each calendar year. The amount due is equal to the following: [(lbs of phosphorus discharged minus the permittee's target value) times ($53.01 per pound) or $640,000, whichever is less. See the payment calculation steps in the Surface Water section. The permittee shall submit Form 3200-151 to the Department by March 1 of each calendar year indicating total amount remitted to the participating counties to verify that the correct payment was made. The first payment verification form is due by the specified Due Date. Note: The applicable Target Value is 0.2 mg/L as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is $50.00 adjusted for CPI.	03/01/2020
Annual Verification of Payment #2: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2021
Annual Verification of Payment #3: Submit Form 3200-151 to the Department indicating total	03/01/2022

amount remitted to the participating counties.	
Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2023
Annual Verification of Payment #5: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2024
Annual Verification of Payment After Permit Expiration: In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to submit Form 3200-151 to the Department indicating total amount remitted to the participating counties by March 1 each year.	
Continued Coverage: If the permittee intends to seek a renewed variance, an application for the MDV (Multi Discharger Variance) shall be submitted as part of the application for permit reissuance in accordance with s. 283.16(4)(b), Wis. Stats.	

4.3 Chloride Target Value

As a condition of the variance to the water quality based effluent limitation(s) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code, the permittee shall perform the following actions.

Required Action	Due Date
Annual Chloride Progress Report: Submit an annual chloride progress report. The annual chloride progress report shall: Indicate which chloride source reduction measures or activities in the approved Source Reduction Plan have been implemented; Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data; and Include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride such as loads from industries or road salt intrusion into the collection system. Note that the interim limitation of 710 mg/L weekly average November through April, 450 mg/L weekly average May thorugh October, and 1400 mg/L daily maximum year-round remains enforceable until new enforceable limits are established in the next permit issuance. The first annual chloride progress report is to be submitted by the Date Due.	06/30/2020
Annual Chloride Progress Report #2: Submit the chloride progress report as defined above.	06/30/2021
Annual Chloride Progress Report #3: Submit the chloride progress report as defined above.	06/30/2022
Annual Chloride Progress Report #4: Submit the chloride progress report as defined above.	06/30/2023
Final Chloride Report: Submit a final report documenting the success in meeting the chloride target values of 400 mg/L, May to Nov and 640 mg/L December to April as well as the anticipated future reduction in chloride sources and chloride effluent concentrations. The report shall summarize chloride source reduction measures that have been implemented during the current permit term and state which, if any, source reduction measures from the approved Source Reduction Plan were not pursued and why. The report shall include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data covering the current permit term. The report shall also include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride such as loads from industries or road salt intrusion into the collection system. Additionally the report shall include proposed target values and source reduction measures for	12/31/2023

negotiations with the department if the permittee intends to seek a renewed chloride variance per s. NR 106.83, Wis. Adm. Code, for the reissued permit. Note that the target value is the benchmark for evaluating the effectiveness of the chloride source reduction measures, but is not an enforceable limitation under the terms of this permit.	
Annual Chloride Reports After Permit Expiration: In the event that this permit is not reissued on time, the permittee shall continue to submit annual chloride reports each year covering source reduction measures implemented and chloride concentration and mass discharge trends.	

5 Standard Requirements

NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

5.1 Reporting and Monitoring Requirements

5.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

5.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

5.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

5.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.
- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.
- For purposes of calculating NR 101 fees, the 2 mg/l lower reporting limits for BOD_5 and Total Suspended Solids shall be considered to be limits of quantitation
- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

5.1.5 Compliance Maintenance Annual Reports

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted and certified by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

The CMAR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The certification verifies that the electronic report is true, accurate and complete.

5.1.6 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings or electronic data records for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

5.1.7 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

5.1.8 Reporting Requirements – Alterations or Additions

The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

- The alteration or addition to the permitted facility may meet one of the criteria for determining whether a facility is a new source.
- The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification requirement applies to pollutants which are not subject to effluent limitations in the existing permit.
- The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use of disposal sites not reported during the permit application process nor reported pursuant to an approved land application plan. Additional sites may not be used for the land application of sludge until department approval is received.

5.2 System Operating Requirements

5.2.1 Noncompliance Reporting

Sanitary sewer overflows and sewage treatment facility overflows shall be reported according to the 'Sanitary Sewer Overflows and Sewage Treatment Facility Overflows' section of this permit.

The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:

- any noncompliance which may endanger health or the environment;
- any violation of an effluent limitation resulting from a bypass;
- any violation of an effluent limitation resulting from an upset; and
- any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

A scheduled bypass approved by the Department under the 'Scheduled Bypass' section of this permit shall not be subject to the reporting required under this section.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. **The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill. To report a hazardous substance spill, call DNR's 24-hour HOTLINE at 1-800-943-0003.**

5.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

5.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-555, Wis. Adm. Code.

5.2.4 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

5.2.5 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;
- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

5.2.6 Bypass

This condition applies only to bypassing at a sewage treatment facility that is not a scheduled bypass, approved blending as a specific condition of this permit, a sewage treatment facility overflow or a controlled diversion as provided in the sections titled 'Scheduled Bypass', 'Blending' (if approved), 'SSO's and Sewage Treatment Facility Overflows' and 'Controlled Diversions' of this permit. Any other bypass at the sewage treatment facility is prohibited and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats. The Department may approve a bypass if the permittee demonstrates all the following conditions apply:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance. When evaluating feasibility of alternatives, the department may consider factors such as technical achievability, costs and affordability of implementation and risks to public health, the environment and, where the permittee is a municipality, the welfare of the community served; and
- The bypass was reported in accordance with the Noncompliance Reporting section of this permit.

5.2.7 Scheduled Bypass

Whenever the permittee anticipates the need to bypass for purposes of efficient operations and maintenance and the permittee may not meet the conditions for controlled diversions in the 'Controlled Diversions' section of this permit, the permittee shall obtain prior written approval from the Department for the scheduled bypass. A permittee's written request for Department approval of a scheduled bypass shall demonstrate that the conditions for bypassing specified in the above section titled 'Bypass' are met and include the proposed date and reason for the bypass, estimated volume and duration of the bypass, alternatives to bypassing and measures to mitigate environmental harm caused by the bypass. The department may require the permittee to provide public notification for a scheduled bypass if it is determined there is significant public interest in the proposed action and may recommend mitigation measures to minimize the impact of such bypass.

5.2.8 Controlled Diversions

Controlled diversions are allowed only when necessary for essential maintenance to assure efficient operation. Sewage treatment facilities that have multiple treatment units to treat variable or seasonal loading conditions may shut down redundant treatment units when necessary for efficient operation. The following requirements shall be met during controlled diversions:

- Effluent from the sewage treatment facility shall meet the effluent limitations established in the permit. Wastewater that is diverted around a treatment unit or treatment process during a controlled diversion shall be recombined with wastewater that is not diverted prior to the effluent sampling location and prior to effluent discharge;
- A controlled diversion does not include blending as defined in s. NR 210.03(2e), Wis. Adm. Code, and as may only be approved under s. NR 210.12. A controlled diversion may not occur during periods of excessive flow or other abnormal wastewater characteristics;
- A controlled diversion may not result in a wastewater treatment facility overflow; and
- All instances of controlled diversions shall be documented in sewage treatment facility records and such records shall be available to the department on request.

5.2.9 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

5.2.10 Operator Certification

The wastewater treatment facility shall be under the direct supervision of a state certified operator. In accordance with s. NR 114.53, Wis. Adm. Code, every WPDES permitted treatment plant shall have a designated operator-in-charge holding a current and valid certificate. The designated operator-in-charge shall be certified at the level and in all subclasses of the treatment plant, except laboratory. Treatment plant owners shall notify the department of any changes in the operator-in-charge within 30 days. Note that s. NR 114.52(22), Wis. Adm. Code, lists types of facilities that are excluded from operator certification requirements (i.e. private sewage systems, pretreatment facilities discharging to public sewers, industrial wastewater treatment that consists solely of land disposal, agricultural digesters and concentrated aquatic production facilities with no biological treatment).

5.3 Sewage Collection Systems

5.3.1 Sanitary Sewage Overflows and Sewage Treatment Facility Overflows

5.3.1.1 Overflows Prohibited

Any overflow or discharge of wastewater from the sewage collection system or at the sewage treatment facility, other than from permitted outfalls, is prohibited. The permittee shall provide information on whether any of the following conditions existed when an overflow occurred:

- The sanitary sewer overflow or sewage treatment facility overflow was unavoidable to prevent loss of life, personal injury or severe property damage;
- There were no feasible alternatives to the sanitary sewer overflow or sewage treatment facility overflow such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or preventative maintenance activities;
- The sanitary sewer overflow or the sewage treatment facility overflow was caused by unusual or severe weather related conditions such as large or successive precipitation events, snowmelt, saturated soil conditions, or severe weather occurring in the area served by the sewage collection system or sewage treatment facility; and
- The sanitary sewer overflow or the sewage treatment facility overflow was unintentional, temporary, and caused by an accident or other factors beyond the reasonable control of the permittee.

5.3.1.2 Permittee Response to Overflows

Whenever a sanitary sewer overflow or sewage treatment facility overflow occurs, the permittee shall take all feasible steps to control or limit the volume of untreated or partially treated wastewater discharged, and terminate the discharge as soon as practicable. Remedial actions, including those in NR 210.21 (3), Wis. Adm. Code, shall be implemented consistent with an emergency response plan developed under the CMOM program.

5.3.1.3 Permittee Reporting

Permittees shall report all sanitary sewer overflows and sewage treatment overflows as follows:

- The permittee shall notify the department by telephone, fax or email as soon as practicable, but no later than 24 hours from the time the permittee becomes aware of the overflow;
- The permittee shall, no later than five days from the time the permittee becomes aware of the overflow, provide to the department the information identified in this paragraph using department form number 3400-184. If an overflow lasts for more than five days, an initial report shall be submitted within 5 days as required in this paragraph and an updated report submitted following cessation of the overflow. At a minimum, the following information shall be included in the report:

  ◦The date and location of the overflow;
  ◦The surface water to which the discharge occurred, if any;
  ◦The duration of the overflow and an estimate of the volume of the overflow;
  ◦A description of the sewer system or treatment facility component from which the discharge occurred such as manhole, lift station, constructed overflow pipe, or crack or other opening in a pipe;
  ◦The estimated date and time when the overflow began and stopped or will be stopped;
  ◦The cause or suspected cause of the overflow including, if appropriate, precipitation, runoff conditions, areas of flooding, soil moisture and other relevant information;
  ◦Steps taken or planned to reduce, eliminate and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
  ◦A description of the actual or potential for human exposure and contact with the wastewater from the overflow;
  ◦Steps taken or planned to mitigate the impacts of the overflow and a schedule of major milestones for those steps;
  ◦To the extent known at the time of reporting, the number and location of building backups caused by excessive flow or other hydraulic constraints in the sewage collection system that occurred

concurrently with the sanitary sewer overflow and that were within the same area of the sewage collection system as the sanitary sewer overflow; and

◦The reason the overflow occurred or explanation of other contributing circumstances that resulted in the overflow event. This includes any information available including whether the overflow was unavoidable to prevent loss of life, personal injury, or severe property damage and whether there were feasible alternatives to the overflow.

NOTE: A copy of form 3400-184 for reporting sanitary sewer overflows and sewage treatment facility overflows may be obtained from the department or accessed on the department's web site at http://dnr.wi.gov/topic/wastewater/SSOreport.html. As indicated on the form, additional information may be submitted to supplement the information required by the form.

- The permittee shall identify each specific location and each day on which a sanitary sewer overflow or sewage treatment facility overflow occurs as a discrete sanitary sewer overflow or sewage treatment facility overflow occurrence. An occurrence may be more than one day if the circumstances causing the sanitary sewer overflow or sewage treatment facility overflow results in a discharge duration of greater than 24 hours. If there is a stop and restart of the overflow at the same location within 24 hours and the overflow is caused by the same circumstance, it may be reported as one occurrence. Sanitary sewer overflow occurrences at a specific location that are separated by more than 24 hours shall be reported as separate occurrences; and
- A permittee that is required to submit wastewater discharge monitoring reports under NR 205.07 (1) (r) shall also report all sanitary sewer overflows and sewage treatment facility overflows on that report.

5.3.1.4 Public Notification

The permittee shall notify the public of any sanitary sewer and sewage treatment facility overflows consistent with its emergency response plan required under the CMOM (Capacity, Management, Operation and Maintenance) section of this permit and s. NR 210.23 (4) (f), Wis. Adm. Code. Such public notification shall occur promptly following any overflow event using the most effective and efficient communications available in the community. At minimum, a daily newspaper of general circulation in the county(s) and municipality whose waters may be affected by the overflow shall be notified by written or electronic communication.

5.3.2 Capacity, Management, Operation and Maintenance (CMOM) Program

- The permittee shall have written documentation of the Capacity, Management, Operation and Maintenance (CMOM) program components in accordance with s. NR 210.23(4), Wis. Adm. Code. Such documentation shall be available for Department review upon request. The Department may request that the permittee provide this documentation or prepare a summary of the permittee's CMOM program at the time of application for reissuance of the WPDES permit.
- The permittee shall implement a CMOM program in accordance with s. NR 210.23, Wis. Adm. Code.
- The permittee shall at least annually conduct a self-audit of activities conducted under the permittee's CMOM program to ensure CMOM components are being implemented as necessary to meet the general standards of s. NR 210.23(3), Wis. Adm. Code.

5.3.3 Sewer Cleaning Debris and Materials

All debris and material removed from cleaning sanitary sewers shall be managed to prevent nuisances, run-off, ground infiltration or prohibited discharges.

- Debris and solid waste shall be dewatered, dried and then disposed of at a licensed solid waste facility.
- Liquid waste from the cleaning and dewatering operations shall be collected and disposed of at a permitted wastewater treatment facility.

- Combination waste including liquid waste along with debris and solid waste may be disposed of at a licensed solid waste facility or wastewater treatment facility willing to accept the waste.

5.4 Surface Water Requirements

5.4.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

5.4.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average concentration limits and mass limits and total load limits:

Weekly/Monthly/Six-Month/Annual Average Concentration = the sum of all daily results for that week/month/six-month/year, divided by the number of results during that time period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

Six-Month Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the six-month period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Annual Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the entire year.

Total Monthly Discharge: = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

Total Annual Discharge: = sum of total monthly discharges for the calendar year.

12-Month Rolling Sum of Total Monthly Discharge: = the sum of the most recent 12 consecutive months of Total Monthly Discharges.

5.4.3 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

5.4.4 Surface Water Uses and Criteria

In accordance with NR 102.04, Wis. Adm. Code, surface water uses and criteria are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all surface waters including the mixing zone meet the following conditions at all times and under all flow and water level conditions:

a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.

b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state.

c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state.

d) Substances in concentrations or in combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

5.4.5 Percent Removal

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively. This requirement does not apply to removal of total suspended solids if the permittee operates a lagoon system and has received a variance for suspended solids granted under NR 210.07(2), Wis. Adm. Code.

5.4.6 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

5.4.7 Whole Effluent Toxicity (WET) Identification and Reduction

Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;

- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:

  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)

- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;

- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

5.4.8 Reopener Clause

Pursuant to s. 283.15(11), Wis. Stat. and 40 CFR 131.20, the Department may modify or revoke and reissue this permit if, through the triennial standard review process, the Department determines that the terms and conditions of this permit need to be updated to reflect the highest attainable condition of the receiving water.

5.5 Land Application Requirements

5.5.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

5.5.2 General Sludge Management Information

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

5.5.3 Sludge Samples

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

5.5.4 Land Application Characteristic Report

Each report shall consist of a Characteristic Form 3400-49 and Lab Report. The Characteristic Report Form 3400-49 shall be submitted electronically by January 31 following each year of analysis.

Following submittal of the electronic Characteristic Report Form 3400-49, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report is true, accurate and complete. The Lab Report must be sent directly to the facility's DNR sludge representative or basin engineer unless approval for not submitting the lab reports has been given.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg .

All results shall be reported on a dry weight basis.

5.5.5 Calculation of Water Extractable Phosphorus

When sludge analysis for Water Extractable Phosphorus is required by this permit, the permittee shall use the following formula to calculate and report Water Extractable Phosphorus:
Water Extractable Phosphorus (% of Total P) =
[Water Extractable Phosphorus (mg/kg, dry wt) ÷ Total Phosphorus (mg/kg, dry wt)] x 100

5.5.6 Annual Land Application Report

Land Application Report Form 3400-55 shall be submitted electronically by January 31, each year whether or not non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code. Following submittal of the electronic Annual Land Application Report Form 3400-55, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.7 Other Methods of Disposal or Distribution Report

The permittee shall submit electronically the Other Methods of Disposal or Distribution Report Form 3400-52 by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied. Following submittal of the electronic Report Form 3400-52, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.8 Approval to Land Apply

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permission from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (l), Wis. Adm. Code.

5.5.9 Soil Analysis Requirements

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

5.5.10 Land Application Site Evaluation

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

5.5.11 Sludge Hauling

The permittee is required to submit Form 3400-52 to the Department. If sludge is hauled to another facility, information shall include the quantity of sludge hauled, the name, address, phone number, contact person, and permit number of the receiving facility. Form 3400-52 shall be submitted annually by January 31 each year whether or not sludge is hauled.

6 Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Description	Date	Page
Facility Modifications - Ammonia Removal & Phosphorus MDV Interim Limit 0.8 mg/L -Plans and Specifications	March 31, 2020	10
Facility Modifications - Ammonia Removal & Phosphorus MDV Interim Limit 0.8 mg/L -Initiate Actions	June 30, 2020	10
Facility Modifications - Ammonia Removal & Phosphorus MDV Interim Limit 0.8 mg/L -Progress Report	December 31, 2020	10
Facility Modifications - Ammonia Removal & Phosphorus MDV Interim Limit 0.8 mg/L -Complete Actions	June 30, 2021	10
Facility Modifications - Ammonia Removal & Phosphorus MDV Interim Limit 0.8 mg/L -Progress Report #1	June 30, 2022	10
Facility Modifications - Ammonia Removal & Phosphorus MDV Interim Limit 0.8 mg/L -Progress Report #2	June 30, 2023	10
Phosphorus Payment per Pound to County -Annual Verification of Phosphorus Payment to County	March 1, 2020	10
Phosphorus Payment per Pound to County -Annual Verification of Payment #2	March 1, 2021	10
Phosphorus Payment per Pound to County -Annual Verification of Payment #3	March 1, 2022	11
Phosphorus Payment per Pound to County -Annual Verification of Payment #4	March 1, 2023	11
Phosphorus Payment per Pound to County -Annual Verification of Payment #5	March 1, 2024	11
Phosphorus Payment per Pound to County -Annual Verification of Payment After Permit Expiration	See Permit	11
Phosphorus Payment per Pound to County -Continued Coverage	See Permit	11
Chloride Target Value -Annual Chloride Progress Report	June 30, 2020	11
Chloride Target Value -Annual Chloride Progress Report #2	June 30, 2021	11
Chloride Target Value -Annual Chloride Progress Report #3	June 30, 2022	11
Chloride Target Value -Annual Chloride Progress Report #4	June 30, 2023	11
Chloride Target Value -Final Chloride Report	December 31, 2023	11
Chloride Target Value -Annual Chloride Reports After Permit Expiration	See Permit	12
Compliance Maintenance Annual Reports (CMAR)	by June 30, each year	14
General Sludge Management Form 3400-48	prior to any significant sludge management changes	22

Characteristic Form 3400-49 and Lab Report	by January 31 following each year of analysis	22
Land Application Report Form 3400-55	by January 31, each year whether or not non-exceptional quality sludge is land applied	23
Other Methods of Disposal or Distribution Report Form 3400-52	by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied	23
Wastewater Discharge Monitoring Report	no later than the date indicated on the form	13

Report forms shall be submitted electronically in accordance with the reporting requirements herein. Any facility plans or plans and specifications for municipal, industrial, industrial pretreatment and non industrial wastewater systems shall be submitted to the Bureau of Water Quality, P.O. Box 7921, Madison, WI 53707-7921. All other submittals required by this permit shall be submitted to:
Southeast Region, 2300 N Dr ML King Drive, Milwaukee, WI 53212

Appendix E

Permit Issuance Meeting Summary

Harrington, Arthur

From: Harrington, Arthur
Sent: Tuesday, November 12, 2019 8:43 AM
To: Dutcher, Andrew J - DNR; DSchilling@sewrpc.org
Cc: LHerrick@sewrpc.org; Hartsook, Bryan D - DNR; lisa.creegan@wisconsin.gov; Jacob.wedesky@wisconsin.gov; Jon Cameron; Tim Pruitt (tpruitt@peglawfirm.com); Gary Hanson (ghanson@sehinc.com); Dan Schaefer; Douglas Nelson; Michael McKinney (Michael@villageofyorkville.com); Brea Grace
Subject: Follow up from 10/11/19 WDNR/SEWRPC/Yorkville meeting regarding sewer facilities upgrade and service area amenment. [GK-Active.FID2763044]

Dear Andrew and David:

I wanted to thank you and your respective team members, once again, for the very helpful discussion on 10/11/19 regarding the path forward for seeking DNR and SEWRPC approvals for the facility plans and sewer service area proposed for the Yorkville District's sanitary sewer proposal.

As you know, the compliance schedule that the District and Village are operating under for the WPDES permit creates some very tight timelines that we need to navigate in connection with these facilities and sewer service area approval requests. In particular, the date by which the facility needs to have approved systems in place to meet most of its applicable effluent limits is June 30, 2021. For this reason, I wanted to use this e-mail to provide you with an update/timeline on our work we discussed at the 10/11 meeting that is necessary for seeking these approvals from your respective agencies.

Week of November 4.

- Draft I-94 Corridor Master Plan to be sent to SEWRPC.

-Village Long Range Planning/ Ordinance Committee (LRPC) approved the I-94 Corridor Master Plan and recommended it to the Plan Commission for public hearing and consideration

Week of November 11th:

- Submit Preliminary Effluent Limits Request to WDNR
- Submit Request for SSA Plan development to SEWRPC

November 2019:

-Continue facility plan development and cost effectiveness analysis
-Village Authorizes SEH for Pre-Design and Design

-Submit draft SSA Amendment for SEWRPC approval contingent upon Village Comp plan approval in December.

- Village to post 30-day Class I public hearing notice for the public hearing required for the Comprehensive Plan amendment which would adopt the I-94 Corridor Master Plan (per Wisconsin State Statutes 66.1001).

November, 2019 – December, 2010: Continued refinement by Village of full Comprehensive Plan and review/discussion with Yorkville's Long Range Planning Committee..

December 2019:

-Incorporate additional facility plan requirements into NOV Report and submit Facility Plan to WDNR
- Complete geotechnical investigation
-Complete field survey of existing WWTP site
-

Dec.-January, 2020:

-December 16,: Tentative date for Public Hearing by joint Plan Commission and Village Board

-Consideration of Approval of an Ordinance for the Comprehensive Plan amendment and adoption of the I-94 Corridor Master Plan.

January 2020:

-SEWRPC Issues 1st Edition SSA Plan & Conducts Public Hearing
-Conduct Public Hearing on Facility Plan
-WDNR Approval of Facility Plan

Feb-April 2020 –

-SEWRPC final decision on request for SSA approval during February Board meeting.

January through June 2020: Complete Design for facility upgrade

June 30, 2020: Submit Drawings and Specifications to WDNR for proposed facility upgrades.

By providing this summary, we wanted you to know that the Village is diligently working to seek the information that you require for the requested approvals within the tight compliance timeline that we face. Periodically, we will provide these updates to assure you that the Village is using its best efforts on these matters.

Thank you, once again, for the opportunity to consult with you.

Best regards,

Art

Arthur Harrington | *Attorney*
414.287.9414 direct
ajharrin@gklaw.com

GODFREY KAHN S.C.
833 E. Michigan Street, Suite 1800 | Milwaukee, Wisconsin 53202-5615

Appendix F

SSA Map & SEWRPC Correspondence

RESOLUTION NO. 2020-11

VILLAGE OF YORKVILLE
RACINE COUNTY, WISCONSIN

A RESOLUTION ADOPTING A YORKVILLE SANITARY SEWER SERVICE AREA AMENDMENT

THE VILLAGE BOARD OF THE VILLAGE OF YORKVILLE, RACINE COUNTY, WISCONSIN, RESOLVES AS FOLLOWS:

WHEREAS, the Southeastern Wisconsin Regional Planning Commission (SEWRPC), working in cooperation with the Village of Yorkville, has prepared an amendment to the sanitary sewer service area for the Yorkville area; and

WHEREAS, the amendment is set forth in SEWRPC Community Assistance Planning Report No. 337, *Sanitary Sewer Service Area for the Yorkville Sanitary District, Racine County, Wisconsin*, dated June 29, 2020; and

WHEREAS, the Village of Yorkville concurs with the amended sanitary sewer service area set forth in the aforementioned SEWRPC Community Assistance Planning Report No. 337.

NOW, THEREFORE, BE IT RESOLVED THAT the Board of Trustees of the Village of Yorkville, on the 13th day of July, 2020, hereby adopts the SEWRPC Community Assistance Planning Report No. 337, as a guide for the provision of sanitary sewer service within the Yorkville area; and

BE IT FURTHER RESOLVED THAT the Village transmit a certified copy of this Resolution to the Southeastern Wisconsin Regional Planning Commission.

This Resolution was adopted by the Yorkville Village Board on July 13, 2020.

VILLAGE OF YORKVILLE

Ayes: 5

Nays: Ø

Abstentions: Ø

Absences: Ø

By: Douglas Nelson
Douglas Nelson, President

Attest: ______________
Michael McKinney, Administrator/Clerk

#251615
300-300
KJM/BRM/JED/DAS/mid
6/29/20; 6/17/20; 2/6/20

SEWRPC Community Assistance Planning Report No. 337

SANITARY SEWER SERVICE AREA FOR THE YORKVILLE SEWER UTILITY DISTRICT NO. 1
RACINE COUNTY, WISCONSIN

Chapter 1

INTRODUCTION

1.1 BACKGROUND

On July 12, 1979, the Southeastern Wisconsin Regional Planning Commission formally adopted an areawide water quality management plan for Southeastern Wisconsin. The plan's intent is to achieve clean and wholesome surface waters within the seven-county Region, surface waters that are "fishable and swimmable."[1]

The plan has five basic elements: 1) a land use element, consisting of recommendations for the location of new urban development in the Region and for the preservation of primary environmental corridors and prime agricultural lands; 2) a point source pollution abatement element, including recommendations concerning the location and extent of sanitary sewer service areas, the location, type, and capacity of, and the level of treatment to be provided at, sewage treatment facilities, the location and configuration of intercommunity trunk sewers, and the abatement of pollution from sewer system overflows and from industrial wastewater discharges; 3) a nonpoint source pollution abatement element, consisting of recommendations for the control of pollutant runoff from rural and urban lands; 4) a sludge management element, consisting of recommendations for the handling and disposal of sludges from sewage treatment facilities; and 5) recommendations for the establishment of continuing water quality monitoring efforts in the Region.

The plan was formally certified over the period July 23 to September 20, 1979, to all of the local units of government in the Region and to the concerned State and Federal agencies. The plan was formally endorsed by the Wisconsin Natural Resources Board on July 25, 1979. Such endorsement is particularly important because under State law and administrative rules, certain actions by the Wisconsin Department of Natural Resources (WDNR) must be in accordance with the adopted and endorsed plan. These actions include, among others, WDNR approval of waste discharge permits, WDNR approval of State and Federal grants for the construction of wastewater treatment and conveyance facilities, and WDNR approval of locally proposed sanitary sewer extensions.

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[1] *The adopted areawide water quality management plan is documented in SEWRPC Planning Report No. 30,* A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000*, Volume One,* Inventory Findings*; Volume Two,* Alternative Plans*; and Volume Three,* Recommended Plan.

1.2 NEED FOR REFINEMENT AND DETAILING OF LOCAL SANITARY SEWER SERVICE AREAS

The adopted regional water quality management plan includes recommended sanitary sewer service areas attendant to each recommended sewage treatment facility (see Map 1.1). There were in the plan, as initially adopted, a total of 85 such identified sanitary sewer service areas. The initially recommended sanitary sewer service areas were based upon the urban land use configuration identified in the Commission-adopted regional land use plan for the year 2000.[2] As such, the delineation of the areas was necessarily general, and may not have reflected detailed local planning considerations.

Section NR 110.08(4) and Section SPS 382.20(4) of the Wisconsin *Administrative Code* require that the Wisconsin Department of Natural Resources, with respect to public sanitary sewers, and the Wisconsin Department of Safety and Professional Services, with respect to private sanitary sewers, make a finding that all proposed sanitary sewer extensions are in conformance with adopted areawide water quality management plans, including the sanitary sewer service areas identified in such plans. In carrying out their responsibilities in this respect, these Departments require that the Southeastern Wisconsin Regional Planning Commission, as the designated areawide water quality management planning agency for Southeastern Wisconsin, review and comment on each proposed sewer extension as to its relationship to the approved plan and sewer service areas. In order to properly reflect local, as well as areawide planning concerns in the execution of this review responsibility, the Regional Planning Commission, in adopting the areawide water quality management plan, recommends that steps be taken to refine and detail each of the 85 sanitary sewer service areas delineated in the plan in cooperation with the local units of government concerned. The refinement and detailing process consists of the following seven steps:

1. Prepare a base map at an appropriate scale for each sanitary sewer service area identified in the areawide water quality management plan.

2. Delineate on that base map a sanitary sewer service area consistent with the objectives set forth in the adopted regional water quality management plan.[3]

3. Conduct intergovernmental meetings involving the local or areawide unit or units of government concerned. At these meetings, present and discuss the initial sanitary sewer service area delineation and solicit the positions of each of the units of government concerned.

4. Prepare modifications to the initially proposed sanitary sewer service area to reflect concerns expressed at the intergovernmental meetings. These modifications would meet, to the fullest extent practicable, the objectives expressed both in the adopted areawide water quality management and regional land use plans and in any adopted local land use and sanitary sewerage system plans.

5. Hold a public hearing jointly by the Commission and the local or areawide unit or units of government concerned to obtain public reaction to site-specific sewer service area issues that the proposed sewer service area delineation might raise.

6. Prepare a final sanitary sewer service area map and accompanying report.

---

[2]*See SEWRPC Planning Report No. 25,* A Regional Land Use Plan and a Regional Transportation System Plan for Southeastern Wisconsin: 2000*, Volume One,* Inventory Findings*; and Volume Two,* Alternative and Recommended Plans.

[3]*The sewer service areas in the water quality management plan were based upon the urban land use configurations as set forth in the Commission's design year 2000 land use plan. The Commission has since completed and adopted a design year 2050 land use plan, which served as the point of departure in the delineation of the sewer service area set forth in this report.*

7. The Commission would then adopt the final sewer service area map, and the Wisconsin Department of Natural Resources and the U.S. Environmental Protection Agency would certify the map, as an amendment to the adopted areawide water quality management plan. Desirably, the Commission would adopt the map following endorsement of the map by the local or areawide unit or units of government concerned. While the Commission always seeks such a consensus by the local governments concerned, it is recognized that in some cases unanimous support of the refined and detailed sanitary sewer service areas may not be achieved. In those cases, the Commission will have to weigh the positions of the parties concerned and make a final determination concerning the issues involved.

1.3 THE YORKVILLE SANITARY SEWER SERVICE AREA REFINEMENT PROCESS

By letter dated December 9, 2019, the Village of Yorkville requested that the Regional Planning Commission undertake the refinement and detailing of the sanitary sewer service area tributary to the Yorkville Sewer Utility District No. 1 sewage treatment facility.[4] Minor amendments to the regional water quality plan to refine portions of the unrefined Yorkville sewer service area were completed in 1985 and 1990.

The refined sewer service area plan revision includes the consideration of local and county comprehensive plans; 2015 Wisconsin Wetlands Inventory; new FEMA floodplain maps; 2015 environmental corridors; and year 2015 orthophotography for the area. This community assistance planning report presents the refined sewer service area plan. The plan sets forth a proposed sanitary sewer service area for the Yorkville Sewer Utility District No. 1, identifying where sanitary sewer service may be provided. The plan also identifies environmentally significant lands within the proposed sewer service area, along with an explanation of the policies that prohibit or otherwise restrict the extension of sewers within such areas. In addition, the plan presents and evaluates alternative systems for wastewater conveyance and treatment for the Yorkville area and identifies a recommended system. It draws upon the cost-effectiveness analyses developed under alternatives prepared for the Yorkville sewer utility district.

[4]*This area is referred to as the "Town of Yorkville or Ives Grove" unrefined sanitary sewer service area in the regional water quality management plan and the regional land use plan.*

SEWRPC Community Assistance Planning Report No. 337

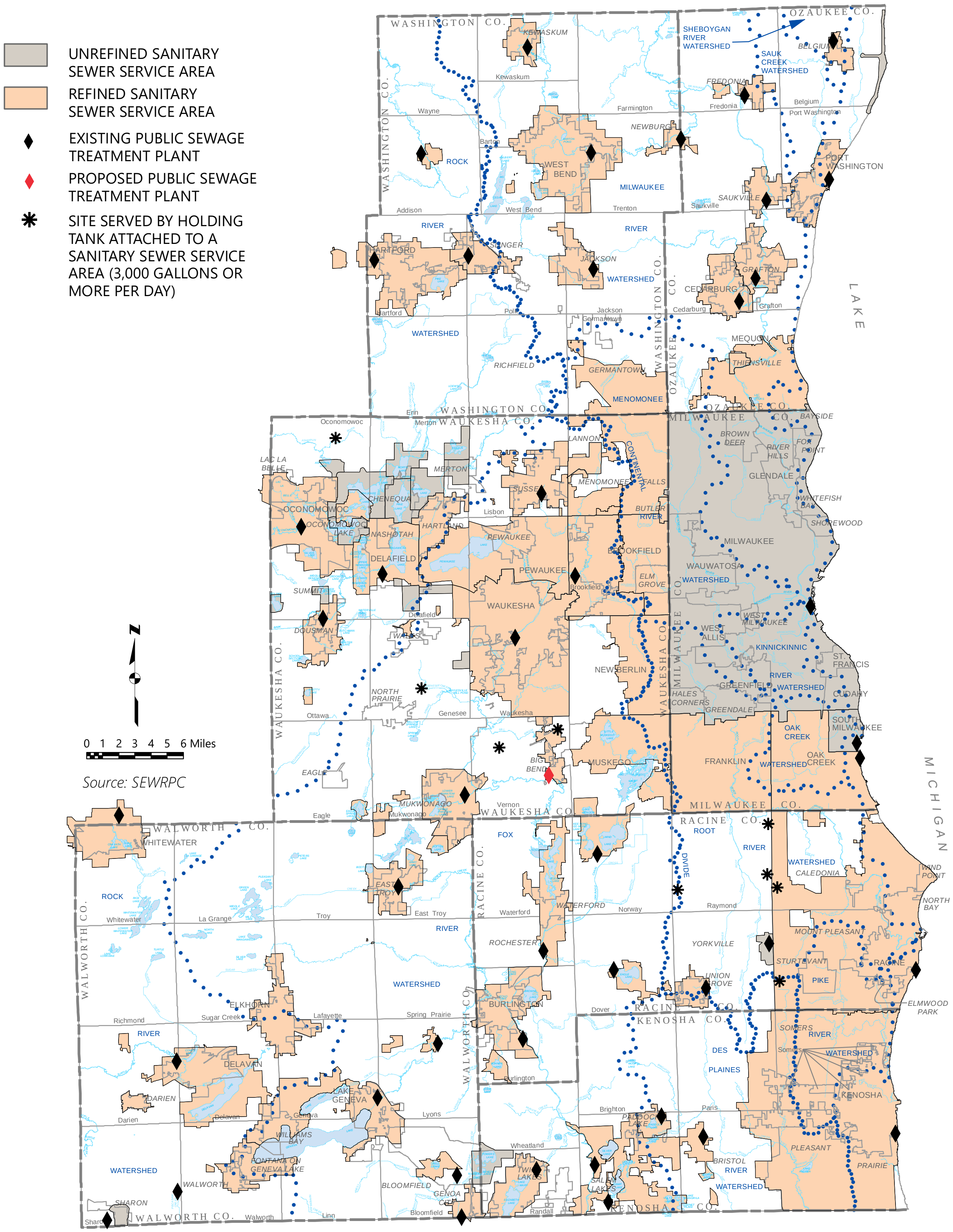
SANITARY SEWER SERVICE AREA FOR THE YORKVILLE SEWER UTILITY DISTRICT NO. 1
RACINE COUNTY, WISCONSIN

Chapter 1

INTRODUCTION

MAPS

Map 1.1
Planned Sanitary Sewer Service Areas in the Region: September 2019



#251617
300-3000
KJM/BRM/JED/LKH/DAS/mid
6/29/20; 6/22/20; 2/6/20

SEWRPC Community Assistance Planning Report No. 337

SANITARY SEWER SERVICE AREA FOR THE YORKVILLE SEWER UTILITY DISTRICT NO. 1
RACINE COUNTY, WISCONSIN

Chapter 2

PROPOSED SANITARY SEWER SERVICE AREA

2.1 INTRODUCTION

A sanitary sewer service area plan is a long-range plan that serves as a guide to extending sanitary sewer service in a locality by identifying the area within which sanitary sewers may extend. Including land within a planned sewer service area enables, but does not mandate, the provision of sanitary sewer service.

A sanitary sewer service area plan also identifies environmentally significant lands within the planned sanitary sewer service area. There are certain restrictions on providing sanitary sewer service within the identified environmentally significant lands, as described later in this chapter.

2.2 CURRENTLY ADOPTED YORKVILLE SANITARY SEWER SERVICE AREA

The initial generalized delineation of the Yorkville sanitary sewer service area as set forth in SEWRPC Planning Report No. 30, *A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000*, considers several important factors. These factors were also an important consideration in developing the adopted regional land use plan. They included, among others, the location, type, and extent of existing urban development; the location of areas where onsite soil absorption sewage disposal systems were known to be failing; the location and extent of gravity drainage areas tributary to existing major sewerage system pumping stations or to sewage treatment plants; the location and capacity of existing and planned trunk sewers; and certain pertinent aspects of the natural resource base, including the location and extent of soils suitable for urban development, the location and extent of primary environmental corridors, and the location and extent of prime agricultural lands.

The planned year 2000 sanitary sewer service area tributary to the Yorkville sewage treatment facility as delineated under the adopted regional water quality management plan, as amended in 1985 and 1990, is shown as a blue shaded area on Map 2.1. That service area encompasses about 938 acres (1.5 square miles).

2.3 REFINED YORKVILLE SANITARY SEWER SERVICE AREA

The purpose of this refinement effort is to comprehensively review the sewer service needs of lands envisioned to be tributary to the Yorkville Sewer Utility District No. 1 sewage treatment facility and to specify the sewer service area boundaries to accommodate the design year 2050 population levels envisioned for this service area. Factors taken into account in determining the refined sanitary sewer service area included the existing boundaries of the Yorkville Sewer Utility District No. 1; the Village of Yorkville comprehensive plan; and SEWRPC Planning Report No. 55, *VISION 2050: A Regional Land Use and Transportation Plan for Southeastern Wisconsin,* as updated in 2020.

Map 2.1 shows the proposed refinements/addition to the currently adopted Yorkville sanitary sewer service area identified by Village of Yorkville officials as a result of this effort.

As identified on Map 2.1, the area proposed by the Village of Yorkville adds about 356 acres to the sewer service area. With the additional acreage, the refined sewer service area encompasses a total of about 1,294 acres, including about 741 acres of existing (2015) developed land and existing street rights-of-way; about 140 acres of environmentally significant lands; and about 413 acres of agricultural and other open land.

Under the Village comprehensive plan, the developable land within the Village-proposed addition to the sewer service area would consist primarily of business park and industrial uses. The existing and planned residential areas within the entire refined sewer service area would accommodate an estimated population of about 310 people under full development conditions.

Map 2.2 shows the refined Yorkville sanitary sewer service area as proposed by the Village. Map 2.2 also shows the environmentally significant lands within the proposed expanded sewer service area. The expanded sewer service area encompasses, in total, about 1,294 acres (2.0 square miles), an increase of 356 acres (0.5 square miles), or 38 percent, over the currently approved sewer service area. The identified environmentally significant lands encompass about 140 acres, or 11 percent of the total sewer service area.

Population Within the Proposed Sewer Service Area

The year 2050 regional land use plan adopted by the Regional Planning Commission in 2020 includes a future population range for each sanitary sewer service area in Southeastern Wisconsin. Under the regional land use plan, the year 2050 population of the Yorkville sewer service area would range from 380 people under an intermediate growth scenario to about 570 people under a high-growth scenario. The planned population of the Yorkville sewer service area under the 2040 stage of the regional land use plan ranges from 370 to 513 under the intermediate and high-growth scenarios. The refined Yorkville sanitary sewer service area would accommodate a population of about 310 persons, assuming full development of vacant lands within the sewer service area as envisioned under the adopted Village comprehensive plan. This population level lies below the intermediate growth end of the range of population levels envisioned under the Commission 2050 regional land use plan, and as such, is not wholly consistent with the adopted regional land use plan. However, it can be noted that this population level is consistent with the Village's comprehensive plan and is anticipated to be consistent with the population level set forth in the Yorkville Facility Plan that is currently nearing completion.

Environmentally Significant Lands Within the Proposed Sewer Service Area

The environmentally significant lands shown on Map 2.2 include areas identified as secondary environmental corridors, isolated natural resource areas, and small wetlands and surface water areas less than five acres in size located outside the environmental corridors and isolated natural resource areas. The series of maps presented as Map 2.3 shows more detailed mapping of the proposed sewer service area and of the environmentally significant lands.

The Regional Planning Commission delineates environmental corridors and isolated natural resource areas as part of its continuing regional planning program. They encompass concentrations of wetlands, woodlands, wildlife habitat, surface water, and other natural resource and resource-related features. Primary environmental corridors are the largest of these, by definition being at least 400 acres in area, two miles in length, and 200 feet in width. No primary environmental corridors currently exist in the Yorkville sewer service area. Secondary environmental corridors are by definition at least 100 acres in area and one mile in length. Isolated natural resource areas are by definition at least 5 acres in area and 200 feet in width. Appendix A of this report explains the methodology used to identify these areas.

The proposed expanded sanitary sewer service area encompasses 97 acres of secondary environmental corridors (7 percent of the sewer service area); and 14 acres of isolated natural resource areas (1 percent of the sewer service area). The proposed sewer service area also encompasses a total of 29 acres of small wetlands and surface water areas located outside the environmental corridors and isolated natural resource areas, accounting for 2 percent of the sewer service area.

Map 2.2 also identifies undeveloped 100-year floodplains located outside the proposed sewer service area. During any future expansions of the sewer service area, this plan will consider such floodplains as potential additions to the adjacent environmental corridors or isolated natural resource areas. Map 2.2 identifies these floodplains in a tan color.

Restrictions on Sewered Development in Environmentally Significant Areas
The regional land use and water quality management plans recommend preserving primary environmental corridors in essentially natural, open use and recommend that County and local units of government consider protecting and preserving secondary environmental corridors and isolated natural resource areas. Consistent with regional plans, policies adhered to by the Wisconsin Department of Natural Resources and Department of Safety and Professional Services in their regulation of sanitary sewerage systems prohibit or otherwise limit the extension of sanitary sewers to serve development in such areas. The following restrictions apply:

1. This plan confines the extension of sanitary sewers to serve new development in primary environmental corridors to limited recreational and institutional uses and rural-density residential development (maximum of one dwelling unit per five acres) in areas other than wetlands, floodplains, riparian buffers, and steep slopes. As noted earlier, no primary environmental corridors currently exist within the proposed Yorkville sewer service area.

2. This plan does not permit the extension of sanitary sewers to serve development in portions of secondary environmental corridors and isolated natural resource areas comprised of wetlands, floodplains, riparian buffers, or steep slopes. Map 2.3 identifies the portions of secondary environmental corridors and isolated natural resource areas comprised of wetlands, floodplains, riparian buffers, or steep slopes within the proposed sewer service area with an orange background color.

This report recognizes that its mapping of environmentally significant areas is a representation of conditions based upon the most recent available natural resource base information. In many cases, as specific development proposals arise, a field survey will be necessary to more precisely identify the boundaries of environmental corridors and isolated natural resource areas in the vicinity of the proposed development.

2.4 WATER QUALITY IMPACTS

The regional water quality management plan and the Yorkville sanitary sewer service area plan presented herein envision that all new urban development within the planned sewer service area would receive sanitary sewer service. These plans intend that the restrictions on sewered urban development in environmentally significant areas, described in the previous section, will avoid significant adverse water quality impacts attendant to the extension of sanitary sewer service. In addition, the planned sanitary sewer service area may provide public sewer service to those lands that are already developed and served by private onsite wastewater sewage systems, which in turn may reduce pollutant loadings from the existing onsite wastewater treatment systems to both surface and ground waters. Assuming that any applicable Federal, State, and local permits are obtained, and that proper site development and construction practices are employed, there should be no significant adverse water quality impacts attributable to the development of the planned sewer service area.

2.5 COST-EFFECTIVENESS ANALYSIS OF SEWAGE CONVEYANCE AND TREATMENT ALTERNATIVES

As detailed in the sanitary sewer service area plan for the City of Racine and environs (SEWRPC Community Assistance Planning Report No. 147 (2nd Edition), *Sanitary Sewer Service Area for the City of Racine and Environs, Racine and Kenosha Counties, Wisconsin*, June 2003), it was anticipated that the entire Yorkville system would be connected to the sewerage system tributary to the City of Racine sewage treatment plant, and the Yorkville sewage treatment plant abandoned when the Yorkville plant reached the end of its useful life, pending cost-effectiveness analyses to be conducted at that time.

Three alternatives for serving the refined sewer service area were evaluated by the Village of Yorkville and its consultant as part of their facility planning process as set forth in the draft document entitled "*WWTP Facilities Plan, Yorkville Utility District No. 1, Village of Yorkville, WI*", dated June 12, 2020, prepared by Short Elliott Hendrickson Inc. (SEH).

- Alternative 1 consists of retaining and modifying the existing Yorkville plant to include construction of a new continuous flow sequencing batch rector (SBR) plant and grit removal system. The 20-year net present worth cost of this alternative would be approximately $7M.

- Alternative 2 consists of abandoning the existing treatment plant and connecting the Yorkville service area to the City of Racine plant, whose collection system is currently within one mile of Yorkville's refined sewer service area. Alternative 2 would have a 20-year net present worth cost of approximately $14M.

- Alternative 3 consists of abandoning the existing treatment plant and connecting the Yorkville service area to the Village of Union Grove treatment plant, which would require construction of approximately five miles of gravity and force main pipe. Alternative 3 would have a 20-year net present worth cost of approximately $18M.

On the basis of the foregoing analysis, Alternative 1, consisting of modifying the existing Yorkville plant to include construction of a new continuous flow sequencing batch reactor (SBR) plant and new grit removal system, is the lowest cost alternative, and as such, is the recommended alternative.

2.6 WASTEWATER TREATMENT PLANT CAPACITY

Current average annual wastewater flows to the wastewater treatment plant from the Yorkville service area are approximately 0.07 million gallons per day (mgd). The new sewer service area, including developable lands within the current sewer service area, could accommodate an increase in population of about 130 people and add about 300 acres of new industrial/business park and commercial development under full development conditions. The anticipated flow to be generated as a result of this development would result in sewage flow rates ranging from about 0.18 mgd to 0.37 mgd on an average annual basis, depending on the amount of flow generated by industrial/business park and commercial development. Thus, the total average annual flow would range from about 0.25 mgd to 0.44 mgd following development of the proposed sewer service area. The current plant capacity is 0.15 mgd. Therefore, the wastewater flows to the Village plant would exceed the current plant capacity if the planned growth in the Village's sewer service area occurs, and it will be necessary for the Village of Yorkville to initiate facility planning for a plant expansion sometime in the planning period prior to the wastewater flows exceeding the plant capacity.

2.7 PUBLIC REACTION TO THE PLAN AMENDMENT

(to be written following the public hearing)

2.8 REGIONAL HOUSING PLAN: JOB/HOUSING BALANCE

Appendix B provides job/housing balance information for the Village of Yorkville developed under the SEWRPC regional housing plan. The inclusion of information from the regional housing plan in sewer service area amendment reports is based upon a regional housing plan recommendation (one of 50 recommendations made under the plan) that 1) SEWRPC provide the findings of the approximate job/housing balance analysis conducted under the regional housing plan to communities requesting an amendment of their sanitary sewer service area and 2) for those communities with a job/housing imbalance, that recommendations be provided to the community for their future consideration in addressing that imbalance. However, it is important to note that the regional housing plan does not intend that meeting the job/housing balance is to be a requirement of any individual sewer service area amendment.

2.9 LOCAL ACTION ON THE PLAN AMENDMENT

(to be written following the public hearing)

2.10 CONCLUDING RECOMMENDATION

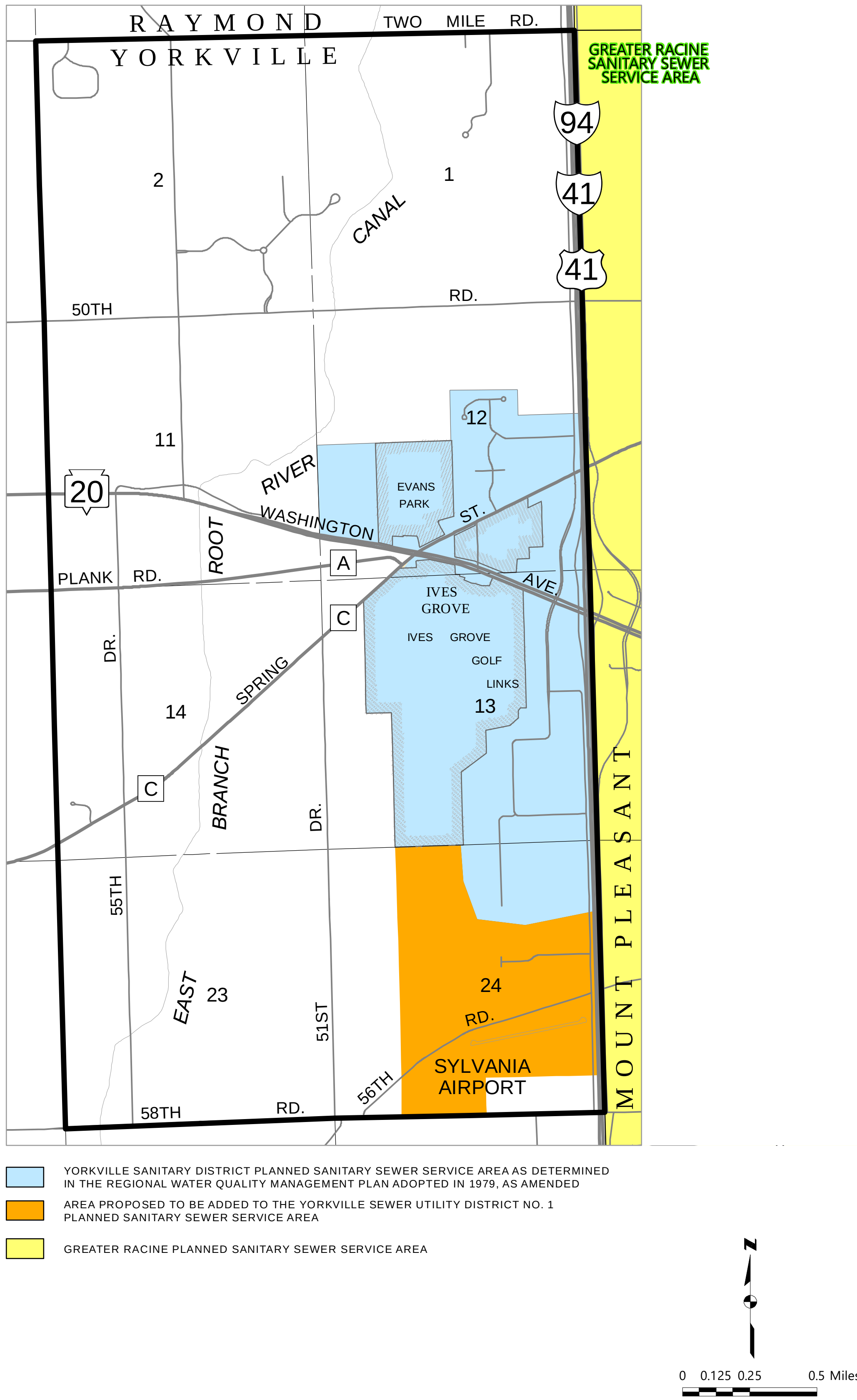
(to be written following the public hearing)

Chapter 2

PROPOSED SANITARY SEWER SERVICE AREA

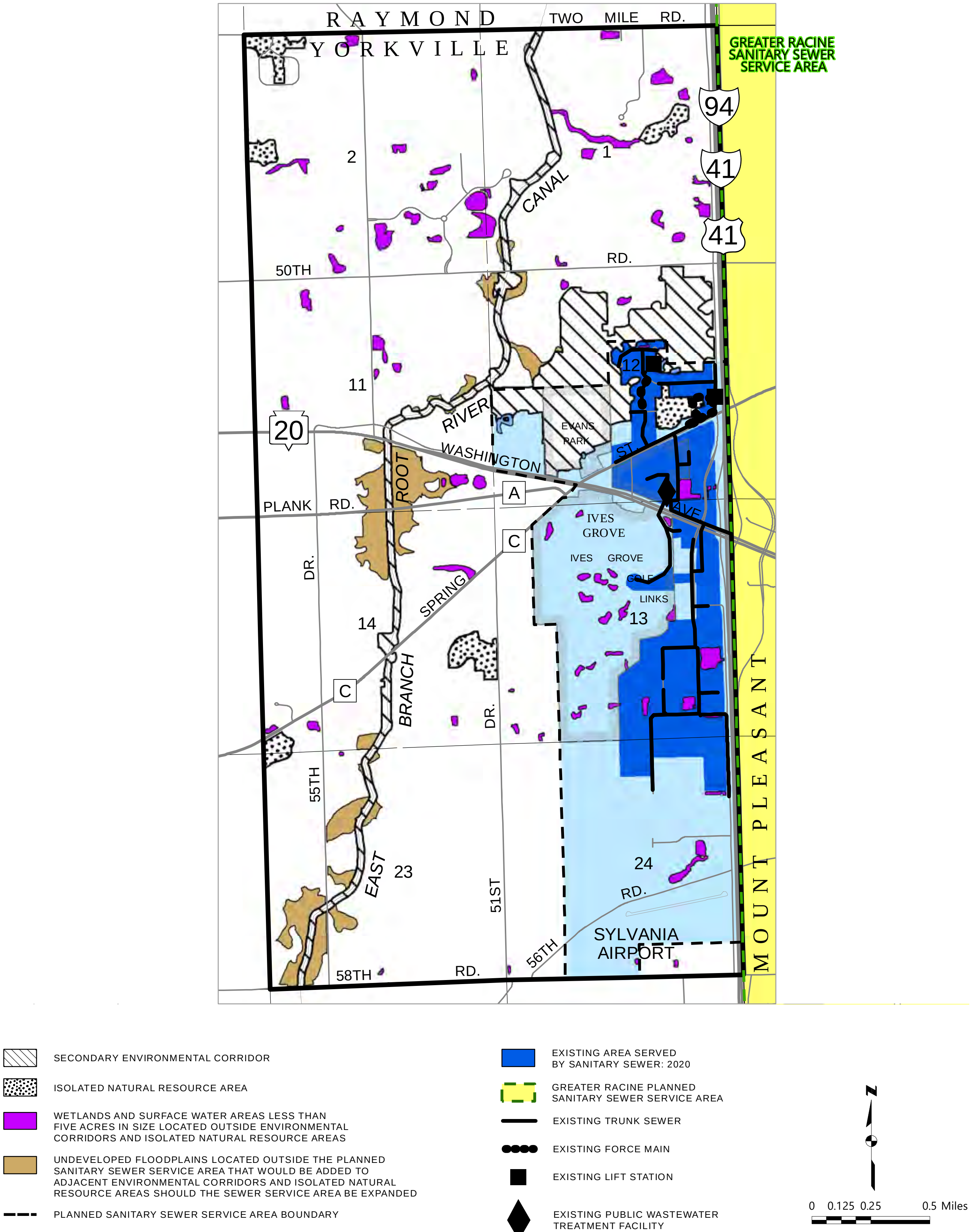
MAPS

Map 2.1
Proposed Changes to the Yorkville Sewer Utility District No. 1 Planned Sanitary Sewer Service Area



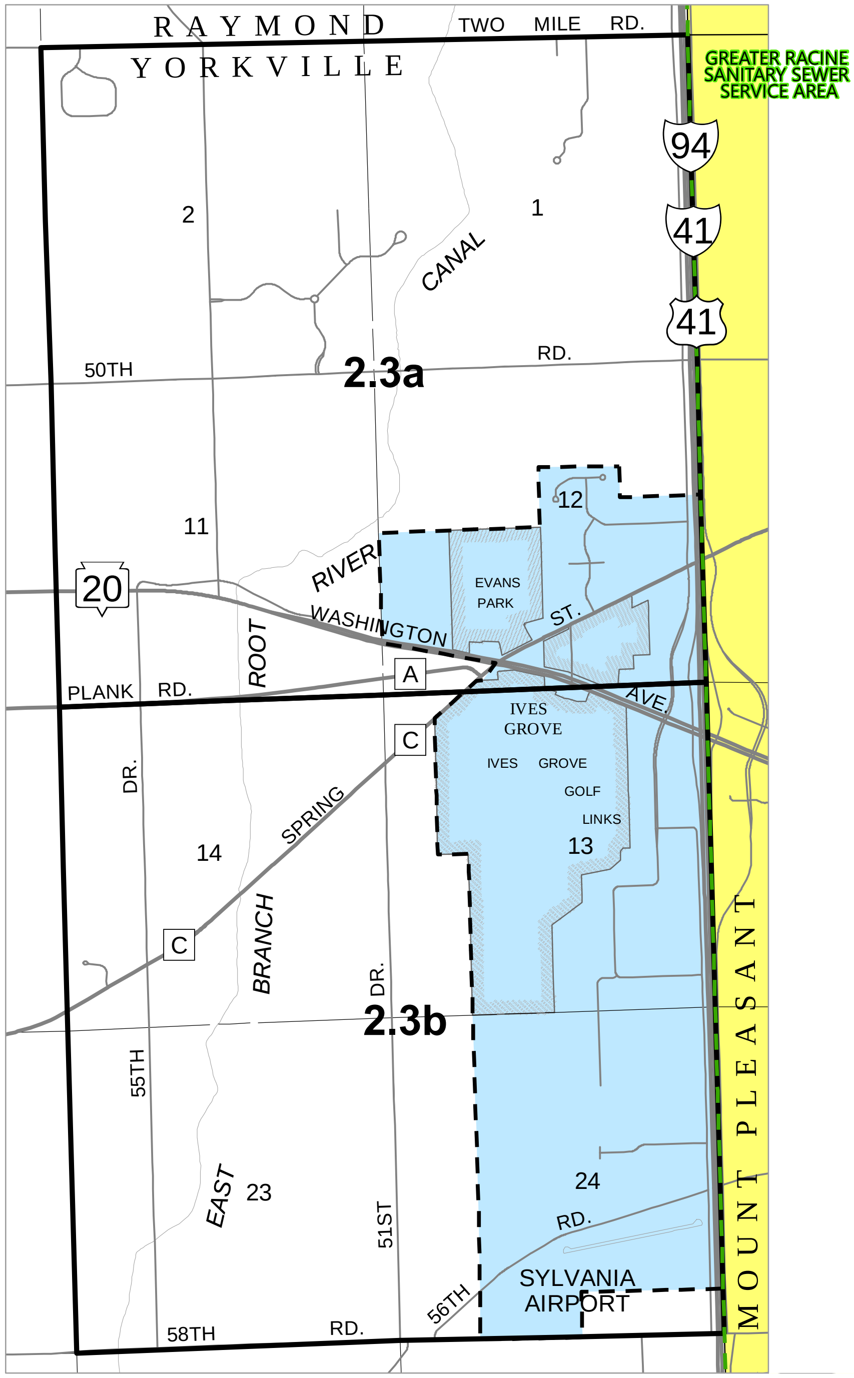
Source: SEWRPC

Map 2.2
Yorkville Sewer Utility District No. 1 Planned Sanitary Sewer Service Area



Source: SEWRPC

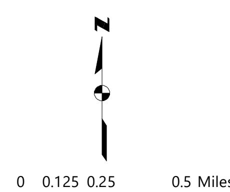
Map 2.3
Index of Maps Showing Environmentally Significant Lands and Planned Sanitary Sewer Service Area for the Yorkville Sewer Utility District No. 1



PLANNED SANITARY SEWER SERVICE AREA BOUNDARY

YORKVILLE SEWER UTILITY DISTRICT NO. 1 PLANNED SANITARY SEWER SERVICE AREA

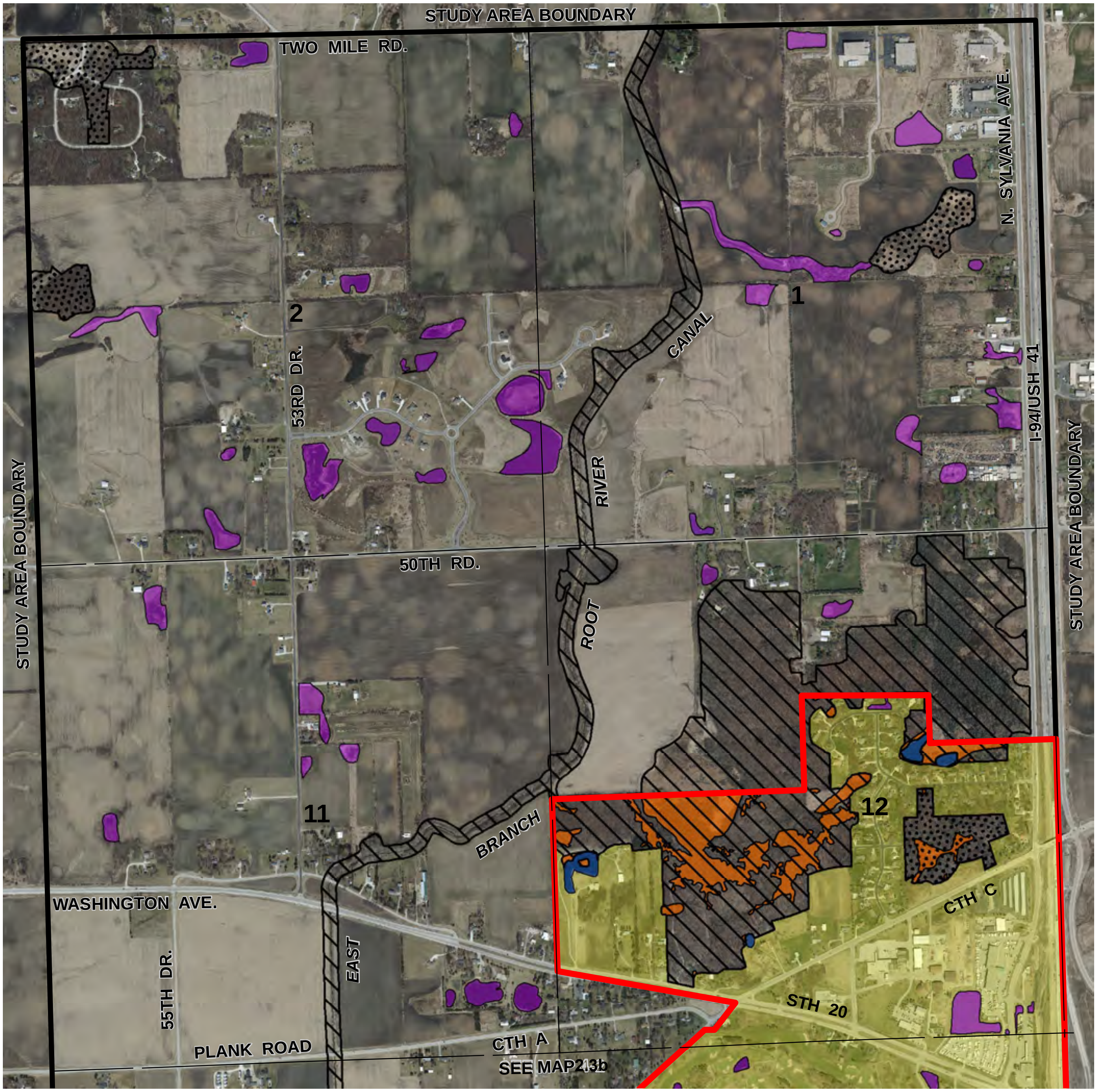
GREATER RACINE PLANNED SANITARY SEWER SERVICE AREA



Source: SEWRPC

Map 2.3a
Environmentally Significant Lands and Planned Sanitary Sewer Service Area for the Yorkville Sewer Utility District No. 1

U.S. Public Land Survey Sections 1, 2, 11, and 12
Township 3 North, Range 21 East



Photography Date: April 2015

SECONDARY ENVIRONMENTAL CORRIDOR

ISOLATED NATURAL RESOURCE AREA

WETLANDS AND SURFACE WATER AREAS LESS THAN FIVE ACRES IN SIZE LOCATED OUTSIDE ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS

SURFACE WATER WITHIN ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS

GROSS SANITARY SEWER SERVICE AREA BOUNDARY

PLANNED SANITARY SEWER SERVICE AREA

RESTRICTIONS ON SEWERED DEVELOPMENT

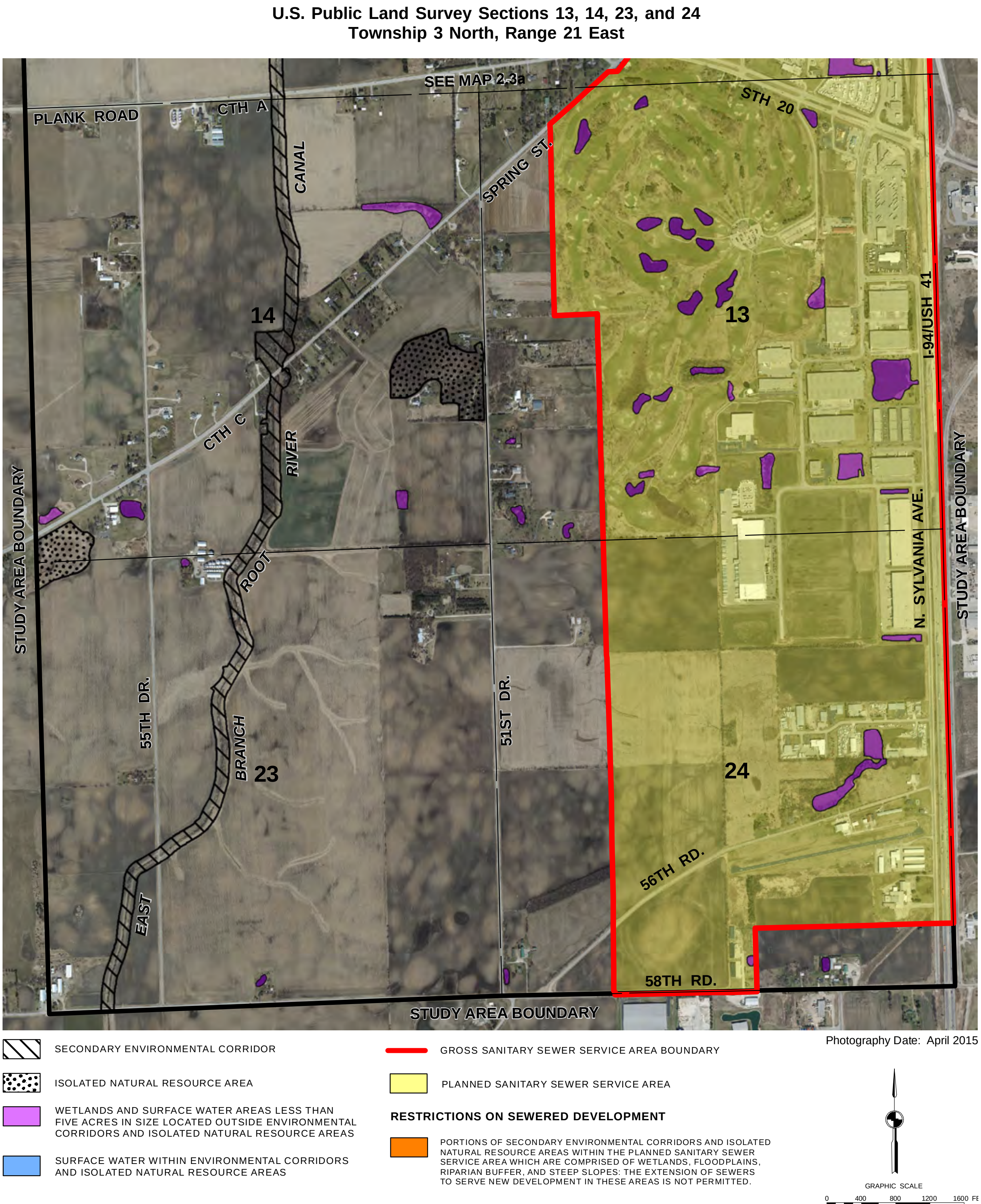
PORTIONS OF SECONDARY ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS WITHIN THE PLANNED SANITARY SEWER SERVICE AREA WHICH ARE COMPRISED OF WETLANDS, FLOODPLAINS, RIPARIAN BUFFER, AND STEEP SLOPES: THE EXTENSION OF SEWERS TO SERVE NEW DEVELOPMENT IN THESE AREAS IS NOT PERMITTED.

GRAPHIC SCALE

0 400 800 1200 1600 FEET

Source: SEWRPC.

Map 2.3b
Environmentally Significant Lands and Planned Sanitary Sewer Service Area for the Yorkville Sewer Utility District No. 1



Source: SEWRPC.

APPENDICES

SEWRPC Community Assistance Planning Report No. 337

SANITARY SEWER SERVICE AREA FOR THE YORKVILLE SEWER UTILITY DISTRICT NO. 1
RACINE COUNTY, WISCONSIN

Appendix A

SUMMARY OF PROCEDURES USED TO IDENTIFY ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS

One of the most important tasks completed by the Commission under the regional planning program for Southeastern Wisconsin is delineating environmental corridors. Environmental corridors are linear areas in the landscape containing concentrations of natural resource and resource-related amenities. These corridors generally lie along the major stream valleys, around major lakes, and in the Kettle Moraine area of Southeastern Wisconsin. Almost all the remaining high-value wetlands, woodlands, wildlife habitat areas, major bodies of surface water, and delineated floodplains and riparian buffers are contained within these corridors. In addition, significant groundwater recharge and discharge areas, many of the most important recreational and scenic areas, and the best remaining potential park sites are located within the environmental corridors. Such corridors are, in effect, a composite of the most important individual elements of the natural resource base in Southeastern Wisconsin, and have immeasurable environmental, ecological, and recreational value.

The process of delineating environmental corridors began with the mapping of individual natural resource and resource-related elements on aerial photographs at a scale of one inch equals 400 feet. The various natural resource and resource-related elements were assigned a numeric rating intended to reflect the value of their natural characteristics. The types of natural resource and resource-related features that were mapped and the point values assigned are indicated in Table A.1.

Areas having a total point value of 10 or more based upon this mapping were identified as having "significant" natural resource value. These areas were, in turn, classified as primary environmental corridors, secondary environmental corridors, or isolated natural resource areas based upon the following criteria:

- Primary environmental corridors encompass at least 400 acres and have a minimum length of at least two miles and a minimum width of at least 200 feet

- Secondary environmental corridors encompass at least 100 acres and have a minimum length of at least one mile

- Isolated natural resource areas encompass at least five acres and have a minimum width of at least 200 feet

The resulting definitions are held out as subject to field verification where appropriate. The Commission staff is frequently called upon by county and local units of government to verify and stake in the field the boundaries of these environmentally significant lands.

Additional documentation regarding the environmental corridor delineation process is presented in an article titled "Refining the Delineation of Environmental Corridors in Southeastern Wisconsin" published in SEWRPC *Technical Record*, Volume Four, Number Two, dated 1981, which may be viewed on the Regional Planning Commission website.

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SANITARY SEWER SERVICE AREA FOR THE YORKVILLE SEWER UTILITY DISTRICT NO. 1
RACINE COUNTY, WISCONSIN

Appendix A

SUMMARY OF PROCEDURES USED TO IDENTIFY ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS

TABLES

#254437 - Yorkville SSA Appendix A Environmental Corridor (Table A.1)
300-3000
KJM/BRM/JED/DAS/mid
6/29/20; 6/23/20; 02/6/2020

Table A.1
Values Assigned to Natural Resource Base and Resource Base-Related Elements in the Process of Delineating Environmental Corridors and Isolated Natural Resource Areas

Natural Resource Base Element	
Element	**Point Value**
Lake	
Major (50 acres or more)	20
Minor (5-49 acres)	20
Rivers or Streams (perennial)	10
Riparian Buffer	
Lake or Perennial River or Stream	10
Intermittent Stream	5
Floodplain (100-year recurrence interval)	3
Wetland	10
Woodland	10
Wildlife Habitat	
Class I	10
Class II	7
Class III	5
Steep Slope	
20 Percent or More	7
12-19 Percent	5
Prairie	10

Natural Resource Base-Related Element	
Element	**Point Value**
Existing Park or Open Space Site	
Rural Open Space Site	5
Other Park and Open Space Site	2
Potential Park Site	
High-Value	3
Medium-Value	2
Low-Value	1
Historic Site	
Structure	1
Other Cultural	1
Archaeological	2
Scenic Viewpoint	5
Natural Area	
State Scientific Area	15
Statewide or Greater Significance	15
County or Regional Significance	10
Local Significance	5

Source: SEWRPC

SEWRPC Community Assistance Planning Report No. 337

SANITARY SEWER SERVICE AREA FOR THE YORKVILLE SEWER UTILITY DISTRICT NO. 1
RACINE COUNTY, WISCONSIN

Appendix B

REGIONAL HOUSING PLAN: JOB/HOUSING BALANCE ANALYSIS

On March 13, 2013, the Regional Planning Commission adopted a regional housing plan for the seven-county Southeastern Wisconsin Region. That plan is documented in SEWRPC Planning Report No. 54, *A Regional Housing Plan for Southeastern Wisconsin*, dated March 2013. The plan addresses a range of housing issues and concerns, including the balance between jobs and housing throughout the Region. The plan includes a generalized analysis of the "job/housing balance" for subareas of the Region. The regional housing plan recommends providing the findings of the job-housing analysis to communities seeking to amend their sanitary sewer service areas, with the intent to inform communities of any job/housing imbalance, and to encourage them to consider addressing the imbalance when they review and update their community comprehensive plan and zoning ordinance. Accordingly, the findings of that analysis are summarized in this appendix.

The job/housing analysis conducted under the regional housing study examined the relationship between jobs and housing that would exist in areas planned by local governments to be served by a public sanitary system, assuming implementation of adopted long-range comprehensive plans for those areas. For each sewered community, the analysis compared the projected relative shares of lower-cost, moderate-cost, and higher-cost housing[1] with the projected relative shares of lower-wage, moderate-wage, and higher-wage jobs,[2] respectively. Job/housing imbalances identified under this analysis are indicated on Map B.1. A "lower-cost" job/housing imbalance indicates a community projected to have a higher percentage of lower-wage jobs than lower-cost housing. A "moderate-cost" job/housing imbalance indicates a community projected to have a higher percentage of moderate-wage jobs than moderate-cost housing.

---

[1] *For purposes of the analysis, lower-cost housing generally includes multi-family dwellings and single- and two-family dwellings at densities of 6,000 square feet or less per dwelling unit; moderate-cost housing includes single- and two-family dwellings at densities of one dwelling per 6,000 to 20,000 square feet for homes constructed prior to 2000 and at densities of one dwelling per 6,000 to 10,000 square feet for housing constructed after 2000; and higher-cost housing includes the balance of the housing stock.*

[2] *For purposes of the analysis, lower-wage jobs include those with an average annual wage that is 80 percent or less than the average annual wage for all jobs in the county; moderate-wage jobs include those with an average annual wage between 80 percent and 135 percent of average annual wage for all jobs in the county; and higher-wage jobs include those with an average annual wage that is 135 percent or more of the annual average wage for all jobs in the county.*

Map B.1 shows the Village of Yorkville is projected to have lower-cost and moderate-cost job/housing imbalances. The regional housing plan would encourage the Village to consider conducting a more detailed job/housing analysis specific to their community, with the community-level analysis considering community-specific wage data and housing price data. The community-specific analysis could also consider the effect of multiple workers in a household, which was not incorporated in the regional-level analysis.

The regional housing plan further recommends that communities which are demonstrated to have a job/housing imbalance following a community-specific analysis consider making changes to their comprehensive plan and zoning ordinance, as appropriate, to enable the provision of housing suitable for the people holding jobs in their community. Actions to address a moderate-cost job/housing imbalance could include modifying the comprehensive plan to permit some single-family residences on smaller lots (1/4 acre or less) and of modest square footage (1,200 square feet). Actions to address a lower-cost job/housing imbalance could include modifying the comprehensive plan to permit some modest multifamily housing (density of at least 10 housing units per acre and 800 to 850 square feet per two bedroom apartment).

Additional information about the housing plan and the job/housing balance analysis is available on the SEWRPC website (www.sewrpc.org/sewrpc/housing.htm) or by contacting the SEWRPC staff.

SEWRPC Community Assistance Planning Report No. 337

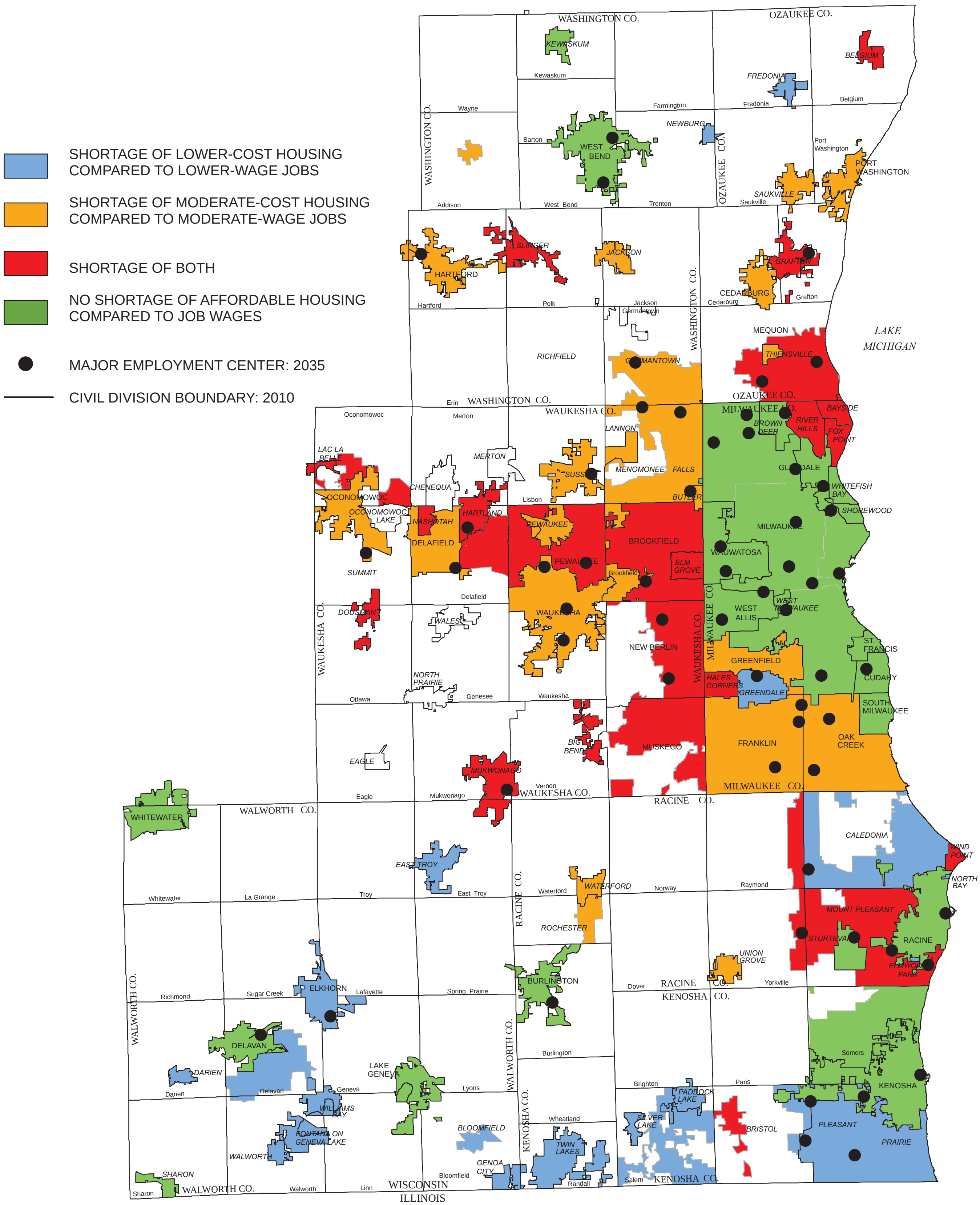
SANITARY SEWER SERVICE AREA FOR THE YORKVILLE SEWER UTILITY DISTRICT NO. 1
RACINE COUNTY, WISCONSIN

Appendix B

REGIONAL HOUSING PLAN:
JOB/HOUSING BALANCE ANALYSIS

MAPS

Map B.1
Projected Job/Housing Imbalances in Sewered Communities in the Region: 2035



Source: Local Government Comprehensive Plans and SEWRPC.

December 9, 2019

RE: Yorkville Sanitary District No. 1
Wastewater Facilities Plan

Kevin J. Muhs
Executive Director
Southeastern Wisconsin Regional Planning Commission (SEWRPC)
P.O. Box 1607
Waukesha, WI 53187-1607

Dear Mr. Muhs:

Subject: Request for First Edition Sanitary Sewer Service Area Plan Development

The Village of Yorkville Utility Commission would like to formally request development of a 1st Edition Sewer Service Area (SSA) Plan by SEWRPC. Short Elliott Hendrickson Inc. (SEH) is currently preparing a wastewater facilities plan for the Yorkville Sanitary District No. 1 (Yorkville) to satisfy two goals:

1. Address unit treatment process deficiencies which have led to several notices of violation (NOV's) from the Wisconsin Department of Natural Resources (WDNR), as well as a subsequent enforcement meeting and compliance schedule that includes a July 1, 2021 compliance deadline for wastewater treatment improvements to address the deficiencies that lead to the NOV. WDNR has already approved an NOV Report which was submitted in October 2018, and recommended construction of a new sequencing batch reactor (SBR) facility at the existing site as the cost effective solution.
2. Address anticipated growth within the newly incorporated Village in response to ancillary development spurred by the FOXCONN development occurring adjacent to the Village of Yorkville in the Village of Mount Pleasant.

This letter serves as the Village's formal request for SEWRPC to prepare a 1st Edition SSA Plan to account for future growth within the Village of Yorkville and to aid in the evaluation and refinement of previously developed (in the NOV Report) future treatment alternatives which will include expanding the existing wastewater treatment facility (WWTF), constructing a new WWTF on a new site, or regionalizing with another permitted facility.

Background

The Yorkville Sanitary SSA has historically been referenced in various SEWRPC documents (primarily other municipalities SSA Revisions) as partially refined. In addition, most SEWRPC prepared publications indicate the Yorkville WWTF is an existing public sewage treatment plant to be abandoned. The original intent of the proposed abandonment was that a time would come when the Racine SSA would grow to a point where the Yorkville WWTF would be abandoned and wastewater would be conveyed to Racine for treatment. Yorkville investigated regionalization with Racine on two occasions recently:

1. During preparation of the Preliminary & Final Compliance Alternatives Plans for Phosphorus in 2016 and early 2017, and found that this alternative, although a lower capital cost, projects to have a very high 20-year present worth cost, substantial impacts to rate payers and did not compare favorably when non-monetary factors are included.

2. Following the Foxxconn announcement in the summer of 2017 through a series of regional meetings between Mt. Pleasant, the Racine Wastewater Utility, Racine County, and each entity's engineering consultant. The conclusion drawn in early 2018 following the series of meetings was the costs associated to Yorkville becoming a regional discharger to Racine were not cost-effective.

Shortly after incorporation the now Village of Yorkville initiated a comprehensive planning process to amend the current comprehensive master plan for Yorkville. This planning process is preparing revisions to the long range comprehensive master plan in a two-stage process. The initial revisions have identified changes along the I-94 corridor The goal of the current facility planning effort is that the 1st Edition SSA match the current comprehensive plan map for the former Town (now Village) of Yorkville, in an effort to reduce the timeframe for completion of the SSA Plan, by not requiring the comprehensive plan amendment process.

<u>Proposed SSA, Population and Flow Projections</u>

Based on the draft approved SSA, SEH is proposing the current unrefined SSA be expanded to cover the area shown in the amended Comprehensive Plan.

Using the amended Comprehensive Planning Area as a starting point for projecting future conditions, the following assumptions were made:

- Current total average daily flows of 71,000 gpd (0.071 MGD)
- Industrial and Mixed-Use Zoning Wastewater Flow Projections will use 535 gpd/acre to be consistent with currently calculated contributions from the existing sewer service area (Existing non-domestic average daily flow of approximately 60,000 gpd over 113 acres)
- No increase in residential area within the proposed SSA
- Secondary Environmental Corridors and Isolated Natural Resource Areas depicted in the 2035 Plan will be excluded from development within the recommended SSA.

Details of the planning projections are found in Tables 1 through 3 on the following pages. In summary:

- Table 1 presents a summary of projected land use within the comprehensive planning and recommended SSA boundary. Within this table, is a breakdown of land use within both the Lake Michigan Basin and the Mississippi River Basin.
- Table 2 presents a summary of the projected flow contributions broken down by type (i.e. residential, commercial/mixed use/industrial)
- Table 3 presents a summary of the 20-yr projected wastewater flows based on the above assumptions and information. Straight-line interpolation was used to estimate projections in 5-year increments.

Table 1. Existing, Future and Total Land Use Within SSA/Comprehensive Planning Area

2035 Land Use From Comprehensive Plan	*Inside or Outside of Existing Service Area?*	*Planning Area, acres*
Great Lakes Basin		
Agricultural, Rural Residential, and Open Land	Inside	1.2
	Outside	0.0
Commercial	Inside	56.9
	Outside	9.4
Governmental and Institutional	Inside	37.2
Industrial	Inside	213.4
	Outside	221.3
Isolated Natural Resource Area	Inside	13.3
Low Density Residential (19,000 ft^2 to 1.49 acres per dwelling unit)	Inside	100.9
	Outside	21.0
Recreational	Inside	305.9
	Outside	7.1
Secondary Environmental Corridor	Inside	84.5
	Outside	51.3
Streets and Highways	Inside	119.7
	Outside	88.0
Surface Water	Inside	2.0
Transportation, Communication and Utilities	Outside	123.4
Mississippi River Basin		
Agricultural, Rural Residential, and open Land	Outside	0.0
Commercial	Outside	0.0
Industrial	Outside	60.4
Secondary Environmental Corridor	Outside	0.0
Streets and Highways	Outside	3.8
Transportation, Communication, and Utilities	Outside	0.0
Overall Total Planning Area		**1,288.2**
Lake Michigan Basin		
Inside Existing Service Area		**935**
Additional Area Outside of Existing Service Area		**289**
Mississippi River Basin (Entirely Outside Existing Service Area)		**64.2**

Table 2. Population Projections

	Units	Existing	5-Year	10-Year	15-Year	20-Year
Year		**2020**	**2025**	**2030**	**2035**	**2040**
Population Served	people	177	177	177	177	177
Population Equivalents[1]	PE	686	1,160	1,624	2,087	2,551

Notes:

1) Assumes 0.17 lb BOD/capita and uses future BOD projections to estimate population equivalents.

Table 3. Flow Projections

Flow	Units	Existing	5-Year	10-Year	15-Year	20-Year	Peaking Factors[1]
Year		**2020**	**2025**	**2030**	**2035**	**2040**	
Minimum Month (at startup)	MGD	0.059	0.098	0.137	0.176	0.215	0.8
Average Annual	MGD	0.071	0.118	0.165	0.213	0.260	1.0
Maximum Month	MGD	0.097	0.162	0.227	0.291	0.356	1.4
Maximum Week	MGD	0.114	0.189	0.265	0.340	0.416	1.6
Peak Day	MGD	0.199	0.331	0.463	0.596	0.728	2.8
Peak Hour[2]	MGD	0.296	0.493	0.690	0.887	1.084	4.2

Notes:

1) Peaking factors for minimum month, maximum month, maximum week, and peak day based on review of current operations data.
2) Uses 10 States Standards Figure 1 and associated equation using population to estimate a Peak Hour Flow Factor.

Oh behalf of the Village of Yorkville and its associated Sanitary District No. 1, please use the information above to prepare a 1st Edition SSA Plan. We look forward to coordinating SSA plan development with SEWRPC and can be available for a call to discuss additional information you may require to aid in the SSA Plan development.

Should you have any questions or comments, please feel free to contact me at 262.888.9439.

Sincerely,

Village of Yorkville

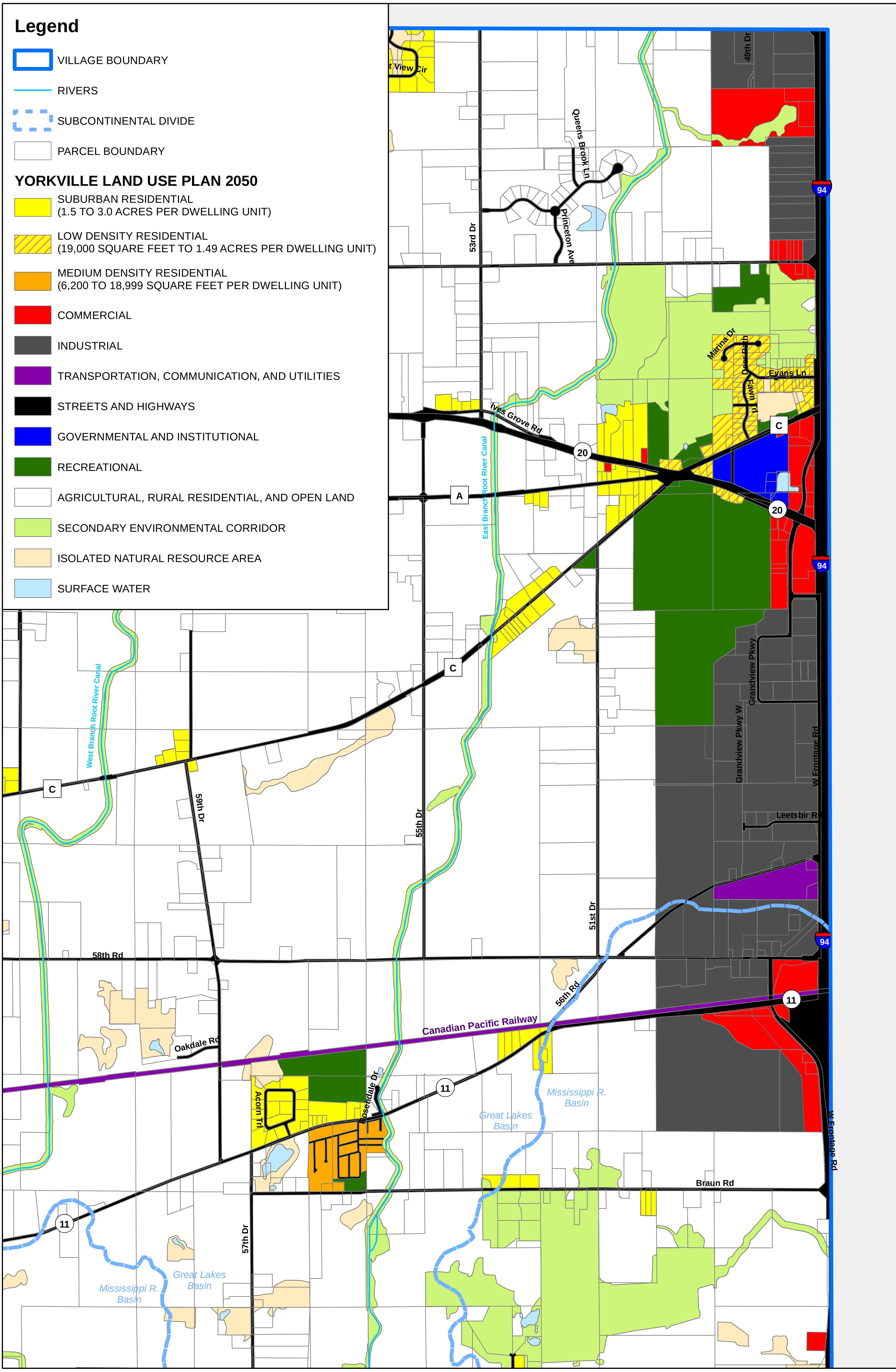
Gary Hanson
Utility Manager

Douglas Nelson
Village President

Attachment No. 1 – Draft Yorkville Comprehensive Plan Amendment
Attachment No. 2 – Yorkville Recommended Future SSA

c: Doug Nelson, Village of Yorkville
Michael McKinney, Village of Yorkville
Dave Schilling, SEWRPC
Laura Herrick, SEWRPC
Dan Schaefer, SEH
Randy Sanford, SEH
Brea Grace, SEH

p:\uz\y\yorsu\146260\1-genl\14-corr\sewrpc\20191209 sewrpc ssa request for village letterhead.docx



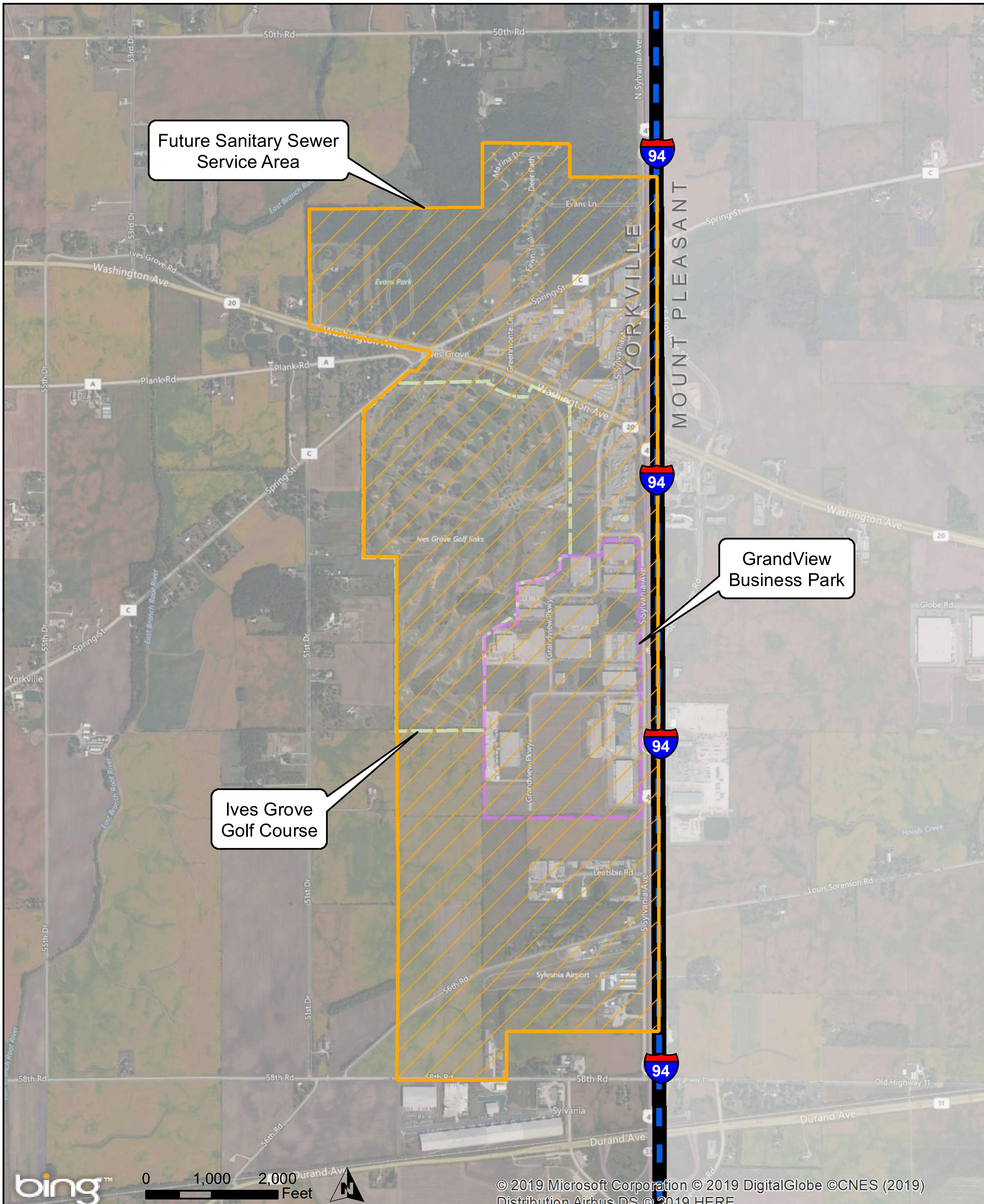
501 Maple Avenue
Delafield, WI 53108
(262) 646-6855

Print Date: 10/15/2019

Map by: mfalk
Projection: WISCRS, Racine County (ft)

Recommended I-94 Corridor Land Use Plan 2050

Village of Yorkville, WI



Path: P:\UZ\Y\YORKV\149602\8-planning\GIS\Utilities\Corridor Plan Utilities.mxd

SEH
316 North Milwaukee Street
Suite 302, Landmark Building
Milwaukee, WI 53202-5888
www.sehinc.com

Project Number: YORKV 149602
Print Date: 10/18/2019
Map by: BG

Future Sanitary Sewer Service Area

Village of Yorkville, WI

Appendix G

Land Use Plan Excerpts

Chapter III

NATURAL RESOURCE BASE INVENTORY AND ANALYSIS

INTRODUCTION

The conservation and wise use of the natural resource base is vital to the sound physical, social, and economic development of an area and to the continued ability of an area to provide a pleasant and habitable environment for life. Any meaningful land use planning effort must, therefore, recognize the existence of a limited natural resource base to which urban and rural development must be properly adjusted in order that the resource base is properly maintained and protected and in order that serious environmental problems are avoided. A sound evaluation and analysis of the natural resource base is, therefore, particularly important to planning for the physical development of an area.

This chapter presents the results of an inventory and analysis of the natural resource base of the Union Grove/Yorkville planning area. Included is descriptive information regarding soils, topography, water resources, vegetation, wildlife habitat, and natural areas. Also included is a description of items closely related to the natural resource base, including outdoor recreation sites. The chapter concludes with a description of the environmental corridors that have been identified within the planning area. These corridors represent concentrations of the most important remaining elements of the natural resource base.

SOILS

Soil properties exert a strong influence on the use of land and on the impacts of changes in land use. Soils are an irreplaceable resource and mounting pressures upon land are constantly making this resource more and more valuable. A need exists in any land use planning program to examine how soils can best be used and managed.

In order to assess the significance of the diverse soils found in Southeastern Wisconsin, the Regional Planning Commission in 1963 negotiated a cooperative agreement with the U.S. Soil Conservation Service[1] under which detailed operational soil surveys were completed for the entire seven-county Region. The survey reports were published in SEWRPC Planning Report No. 8 and in soil survey reports subsequently prepared by the Soil Conservation Service.[2] The surveys have provided sound, definitive data on the physical, chemical, and biological properties of the soils and have provided interpretations of the soil properties for planning, engineering, agricultural, and resource conservation purposes.

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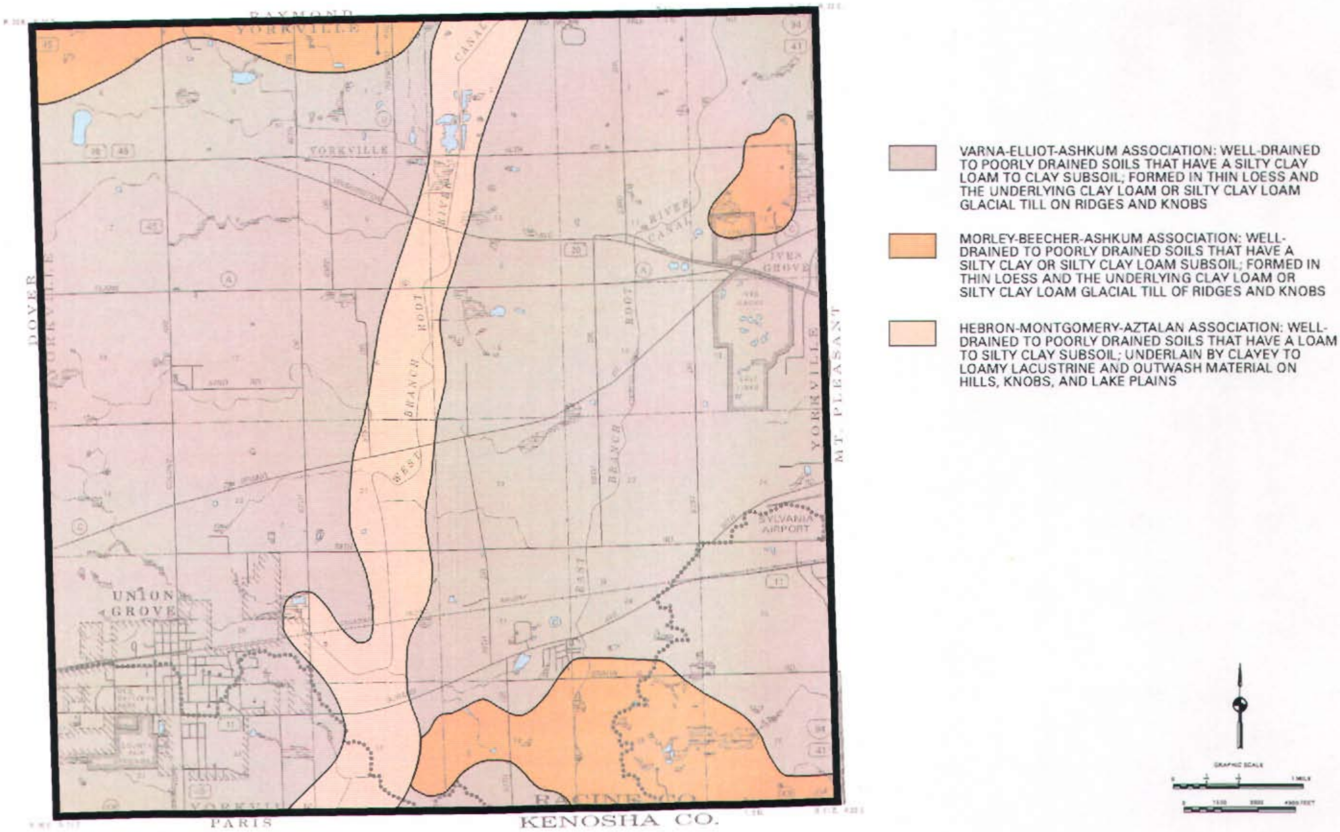
[1]*Now known as the U.S. Department of Agriculture-Natural Resource Conservation Service.*

[2]*SEWRPC Planning Report No. 8,* Soils of Southeastern Wisconsin, *1966; and U.S. Department of Agriculture, Soil Conservation Service,* Soil Survey of Kenosha and Racine Counties, Wisconsin, *1970.*

Map 5

GENERAL SOIL ASSOCIATIONS IN THE UNION GROVE/YORKVILLE PLANNING AREA



Source: SEWRPC.

General Soil Groups

Map 5 provides an overview of the pattern of soils that exists within the planning area. As shown on Map 5:

- Three broad groups of soils, or soil associations, occur within the area: the Hebron-Montgomery-Aztalan association, the Morley-Beecher-Ashkum association, and the Varna-Elliott-Ashkum association.

- The Varna-Elliott-Ashkum association is predominant. This association consists of well-drained to poorly drained soils that have a silty clay loam or clay subsoil. The soils are nearly level to rolling and occur on low, broad ridges and knobs and are generally well suited for farming.

Soil Suitability Interpretations

The soil surveys provide important information regarding the suitability of the land for various urban and rural uses. Interpreting soil surveys in this manner involves evaluating those characteristics of a soil which influence the particular use and assessing the kinds and degrees of limitations those soil properties and qualities, taken together, are likely to impose on the land use in question. Of particular importance in preparing a land use plan for the Union Grove/Yorkville planning area are suitability interpretations for residential development with public sanitary sewer service, for residential development with onsite sewage disposal systems, and for agriculture.

Soil Suitability for Residential Development Served by Public Sanitary Sewers
In view of the fact that public sanitary sewer service is provided within a portion of the planning area, it is important to consider the suitability of soils for residential development served by public sanitary sewers. As shown on Map 6 the detailed soil survey indicates that:

- About 12.6 square miles, or about 35 percent of the planning area, are covered by soils that have severe limitations for residential development with public sanitary sewer service, or stated differently, are poorly suited for residential development of any kind.

- These soils occur in widely dispersed enclaves intermixed with other soils throughout the planning area.

Soil Suitability for Onsite Sewage Disposal Systems
The suitability of soils in the planning area for onsite sewage disposal systems is indicated on Maps 7 and 8. Map 7 indicates suitability for conventional onsite sewage disposal systems; Map 8 indicates suitability for mound type onsite sewage disposal systems. The ratings are expressed in terms of the probability of meeting the criteria governing the siting of onsite sewage disposal systems set forth in Chapter Comm 83 of the Wisconsin Administrative Code. On these maps, areas shown as "suitable" have a high probability of meeting the code requirements for the system concerned, and areas shown as "unsuitable" have a high probability of not meeting the requirements. Areas shown as "undetermined" include soils having a range of characteristics which spans the applicable administrative code criteria, so that no classification can be assigned without more detailed field investigation. It should be noted that Maps 7 and 8 are intended to illustrate the overall pattern of soil suitability for onsite sewage disposal systems. Detailed site investigations based upon the requirements of Chapter Comm 83 are essential to the determination of whether or not the soils on any specific tract of land are suitable for development served by onsite sewage disposal systems.

As shown on Map 7 and 8 and indicated in Table 14:

- About 35.6 square miles, or about 98 percent of the planning area, are covered by soils classified as unsuitable for conventional onsite sewage disposal systems.

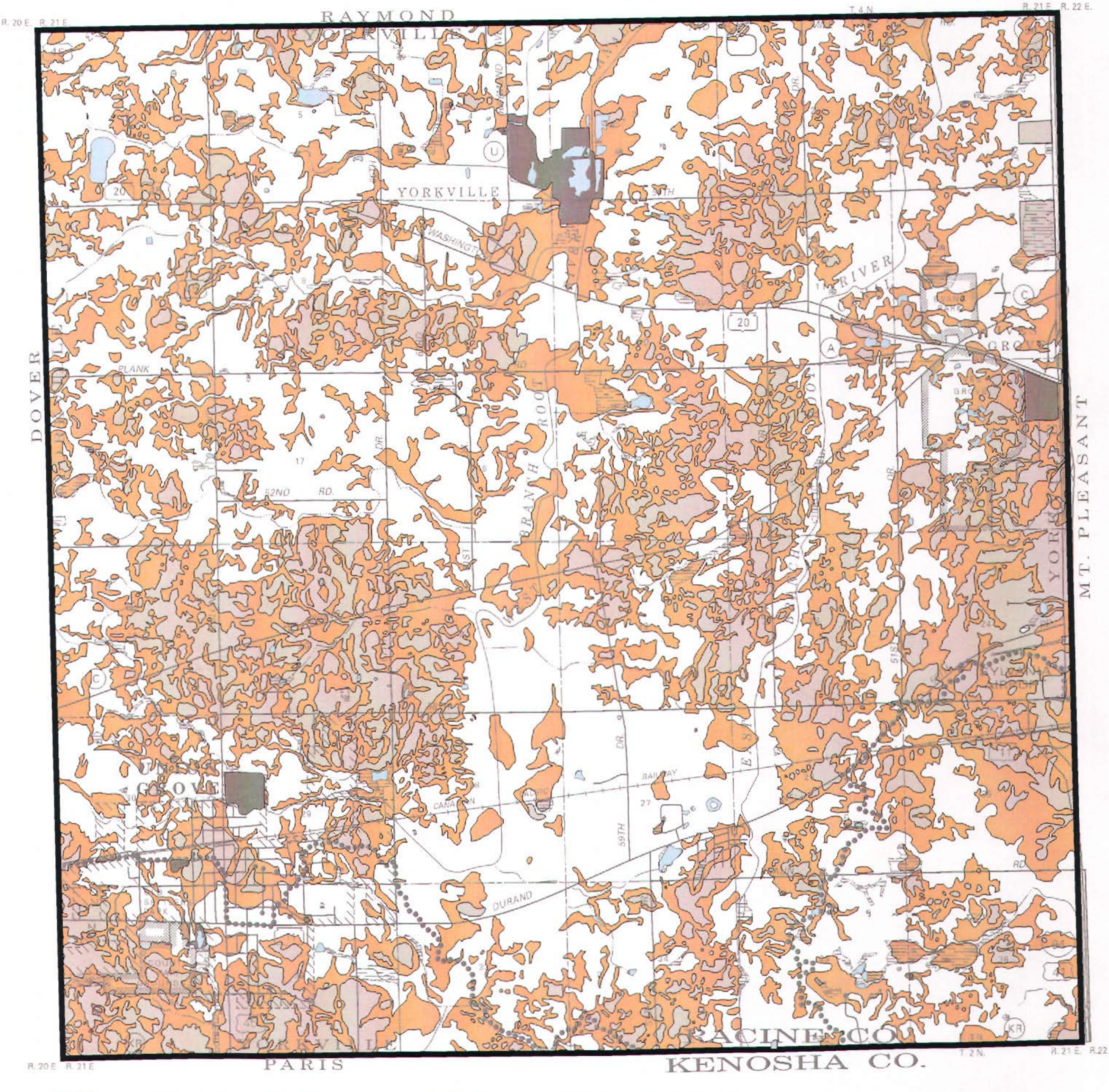
- The development of the mound type onsite sewage disposal systems and other alternative systems has significantly increased the proportion of the planning area which may be able to accommodate development served by onsite sewage disposal systems. Almost 17 square miles, or about 46 percent of the planning area, are covered by soils of undetermined suitability, that is, which may prove suitable for mound type systems upon the completion of detailed field investigations.

The soil ratings for onsite sewage disposal systems presented on Maps 7 and 8 reflect the requirements of Chapter Comm 83 of the *Wisconsin Administrative Code* as it existed in 1998. The Wisconsin Department of Commerce, the State agency responsible for the regulation of such systems, has established new rules which significantly alter the existing regulatory framework, potentially increasing the area in which onsite disposal systems may be utilized.

Agricultural Soil Suitability
Much of the planning area is covered by soils which are well suited for agricultural use. Soil suitability for agricultural use within the undeveloped portion of the planning area, based upon the U.S. Natural Resources Conservation Service classification system, is shown on Map 9. National prime farmland is defined as land that is well suited for the production of food, feed, forage, fiber, and oilseed crops. Such farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when properly treated and managed. Farmland of statewide importance includes lands in addition to national prime farmland which are important for the production of food and fiber, but have some limitations that restrict the choice of plants or require special conservation practices or both. As shown on Map 9:

Map 6

SUITABILITY OF SOILS FOR RESIDENTIAL DEVELOPMENT WITH PUBLIC SANITARY SEWER SERVICE IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1995



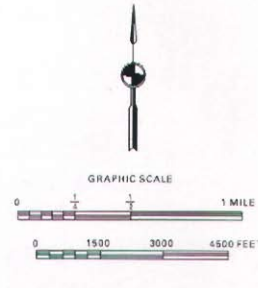
AREAS COVERED BY SOILS HAVING SEVERE LIMITATIONS FOR RESIDENTIAL DEVELOPMENT WITH PUBLIC SANITARY SEWER SERVICE

AREAS COVERED BY SOILS HAVING MODERATE LIMITATIONS FOR RESIDENTIAL DEVELOPMENT WITH PUBLIC SANITARY SEWER SERVICE

AREAS COVERED BY SOILS HAVING SLIGHT LIMITATIONS FOR RESIDENTIAL DEVELOPMENT WITH PUBLIC SANITARY SEWER SERVICE

OTHER: AREAS CONSISTING FOR THE MOST PART OF DISTURBED LAND FOR WHICH NO INTERPRETIVE DATA ARE AVAILABLE

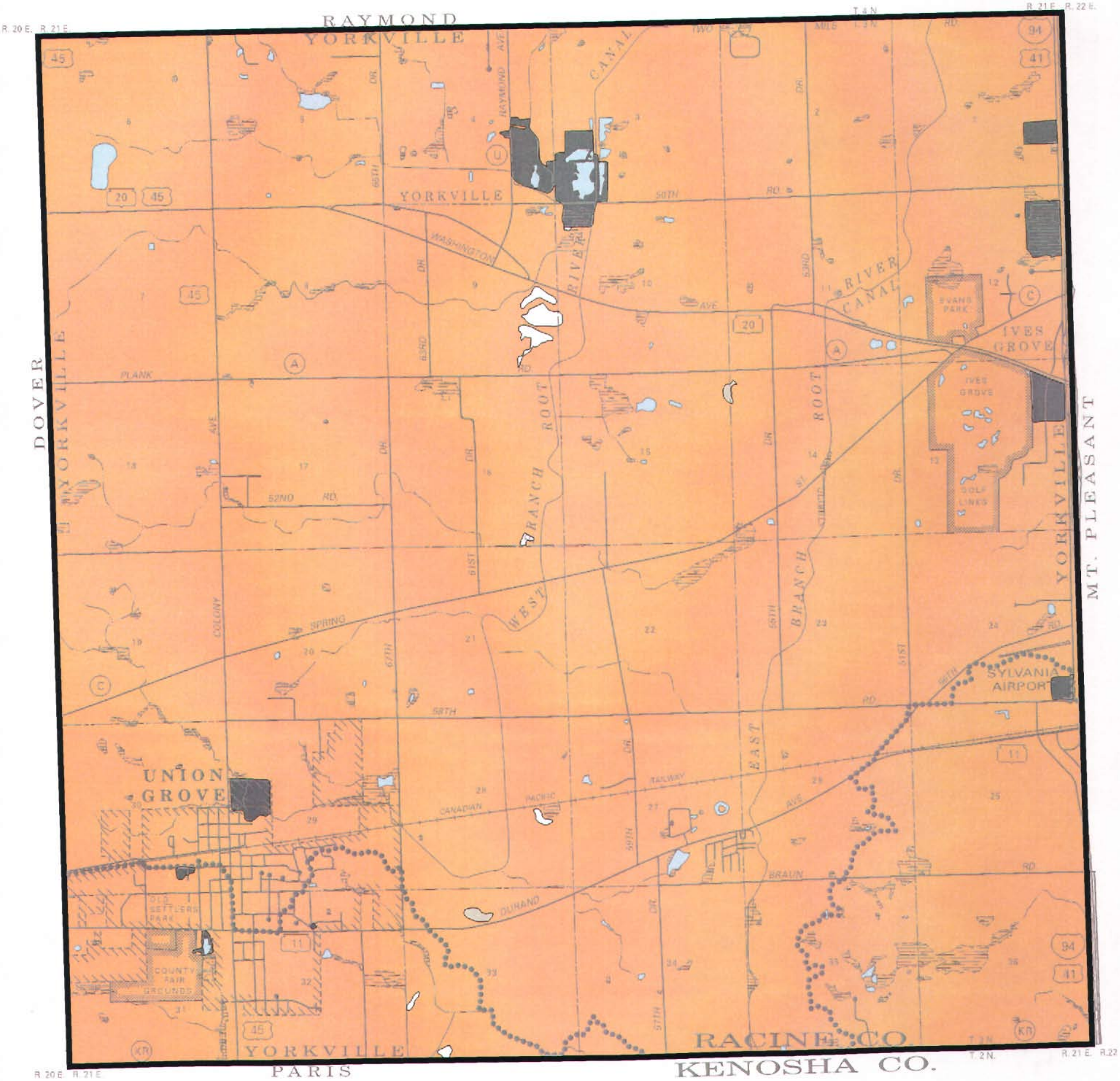
SURFACE WATER



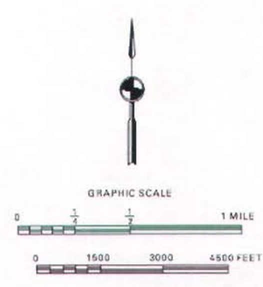
Source: U.S. Natural Resources Conservation Service and SEWRPC.

Map 7

SUITABILITY OF SOILS FOR CONVENTIONAL ONSITE SEWAGE DISPOSAL SYSTEMS IN THE UNION GROVE/YORKVILLE PLANNING AREA



UNSUITABLE: AREAS COVERED BY SOILS HAVING A HIGH PROBABILITY OF NOT MEETING THE CRITERIA OF CHAPTER COMM 83 OF THE WISCONSIN ADMINISTRATIVE CODE GOVERNING CONVENTIONAL ONSITE SEWAGE DISPOSAL SYSTEMS	SURFACE WATER
UNDETERMINED: AREAS COVERED BY SOILS HAVING A RANGE OF CHARACTERISTICS AND/OR SLOPES WHICH SPAN THE CRITERIA OF CHAPTER COMM 83 OF THE WISCONSIN ADMINISTRATIVE CODE GOVERNING CONVENTIONAL ONSITE SEWAGE DISPOSAL SYSTEMS SO THAT NO CLASSIFICATION CAN BE ASSIGNED	OTHER: AREAS CONSISTING FOR THE MOST PART OF DISTURBED LAND FOR WHICH NO INTERPRETIVE DATA ARE AVAILABLE
SUITABLE: AREAS COVERED BY SOILS HAVING A HIGH PROBABILITY OF MEETING THE CRITERIA OF CHAPTER COMM 83 OF THE WISCONSIN ADMINISTRATIVE CODE GOVERNING CONVENTIONAL ONSITE SEWAGE DISPOSAL SYSTEMS	NOTE: ONSITE INVESTIGATIONS ARE ESSENTIAL TO THE DETERMINATION OF WHETHER OR NOT ANY SPECIFIC TRACT OF LAND IS SUITABLE FOR DEVELOPMENT SERVED BY A CONVENTIONAL ONSITE SEWAGE DISPOSAL SYSTEM.



Source: U.S. Natural Resources Conservation Service and SEWRPC.

Map 8

SUITABILITY OF SOILS FOR MOUND SEWAGE DISPOSAL SYSTEMS IN THE UNION GROVE/YORKVILLE PLANNING AREA

UNSUITABLE: AREAS COVERED BY SOILS HAVING A HIGH PROBABILITY OF NOT MEETING THE CRITERIA OF CHAPTER COMM 83 OF THE WISCONSIN ADMINISTRATIVE CODE GOVERNING MOUND ONSITE SEWAGE DISPOSAL SYSTEMS

UNDETERMINED: AREAS COVERED BY SOILS HAVING A RANGE OF CHARACTERISTICS AND/OR SLOPES WHICH SPAN THE CRITERIA OF CHAPTER COMM 83 OF THE WISCONSIN ADMINISTRATIVE CODE GOVERNING MOUND ONSITE SEWAGE DISPOSAL SYSTEMS SO THAT NO CLASSIFICATION CAN BE ASSIGNED

SUITABLE: AREAS COVERED BY SOILS HAVING A HIGH PROBABILITY OF MEETING THE CRITERIA OF CHAPTER COMM 83 OF THE WISCONSIN ADMINISTRATIVE CODE GOVERNING MOUND ONSITE SEWAGE DISPOSAL SYSTEMS

SURFACE WATER

OTHER: AREAS CONSISTING FOR THE MOST PART OF DISTURBED LAND FOR WHICH NO INTERPRETIVE DATA ARE AVAILABLE

NOTE: ONSITE INVESTIGATIONS ARE ESSENTIAL TO THE DETERMINATION OF WHETHER OR NOT ANY SPECIFIC TRACT OF LAND IS SUITABLE FOR DEVELOPMENT SERVED BY A MOUND ONSITE SEWAGE DISPOSAL SYSTEM.

GRAPHIC SCALE: 0, 1/4, 1/2, 1 MILE; 0, 1500, 3000, 4500 FEET

Source: U.S. Natural Resources Conservation Service and SEWRPC.

Table 14

SOIL SUITABILITY FOR ONSITE SEWAGE DISPOSAL SYSTEMS IN THE UNION GROVE/YORKVILLE PLANNING AREA

Classification	Conventional Systems		Mound Systems	
	Square Miles	Percent of Planning Area	Square Miles	Percent of Planning Area
Unsuitable	35.6	98.3	19.0	52.5
Undetermined	- -[a]	- -	16.6	45.8
Suitable	0.1	0.3	0.1	0.3
Other[b]	0.5	1.4	0.5	1.4
Total	36.2	100.0	36.2	100.0

[a]*Less than 0.05 square mile.*

[b]*Includes disturbed areas for which no soil survey data are available and surface water.*

Source: SEWRPC.

- Areas identified as national prime farmland encompass 29.8 square miles, or 89 percent of the undeveloped area of the planning area.

- Areas identified as farmland of statewide importance encompasses 0.6 square mile, or 2 percent of the undeveloped area of the planning area.

TOPOGRAPHIC AND TOPOGRAPHIC-RELATED FEATURES

The topography, or the relative elevation of the land surface, in the Union Grove/Yorkville planning area is determined, generally, by the configuration of the bedrock geology, and by the overlying glacial deposits. The topography of the planning area ranges from nearly level in certain areas to gently rolling in other areas.

Slope is an important determinant of the land uses practicable on a given parcel of land. Lands with steep slopes are generally poorly suited for urban development and for most agricultural purposes. The inappropriate development of steeply sloped areas can result in increased surface water runoff from erosion. Furthermore, steeply sloped areas often have an abundant diversity of plant and animal life compared to surrounding lands. Lands with steep slopes should generally be maintained in natural cover for water quality protection, wildlife habitat, and erosion control purposes.

The soil survey indicates that areas of steep slopes—that is, areas having a slope of 12 percent or greater—encompass only about 0.3 square mile, or less than 1 percent of the planning area as shown on Map 10.

WATERSHEDS FEATURES AND DRAINAGE

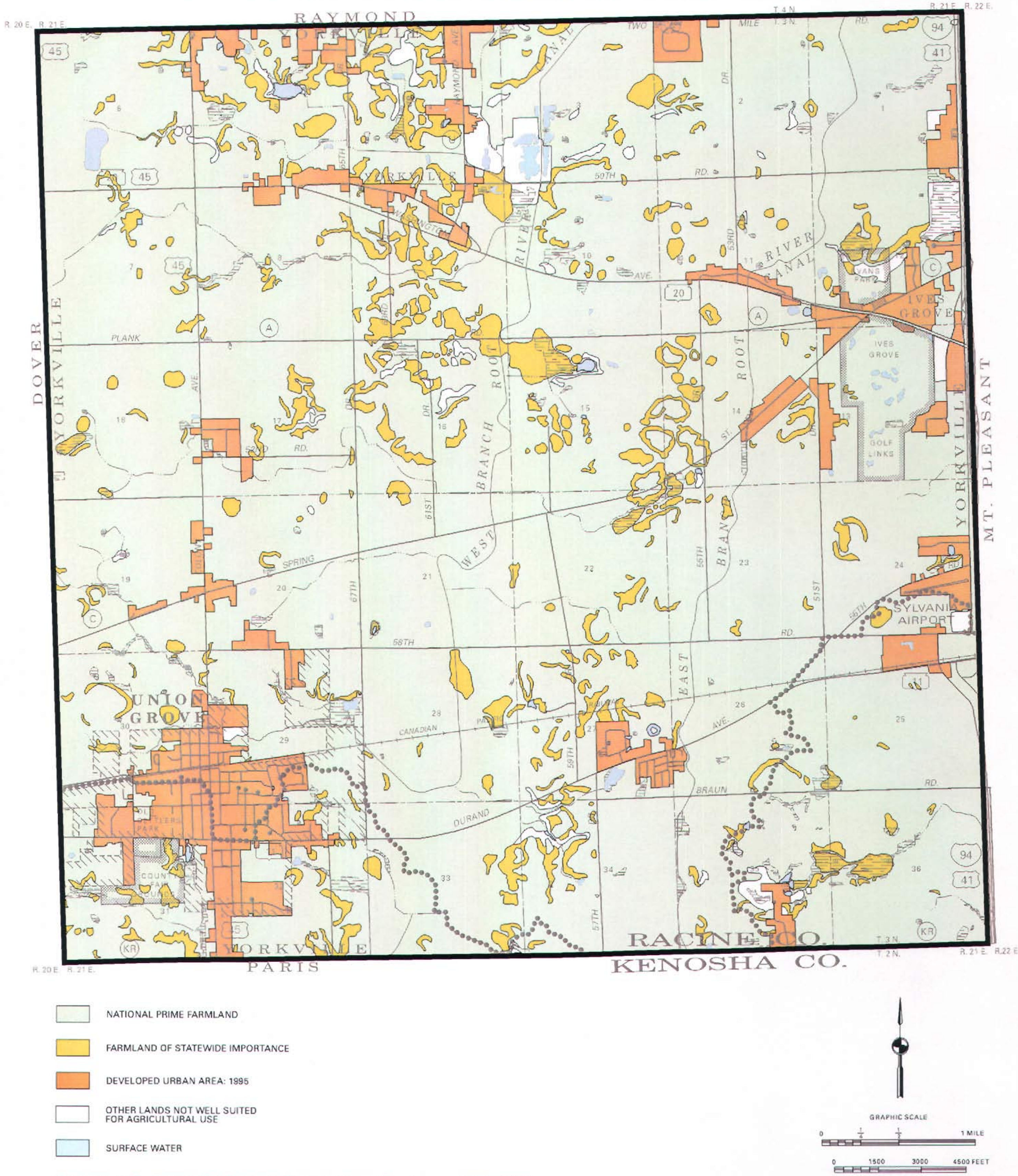
The Union Grove/Yorkville planning area lies within the Des Plaines and Root River watersheds. As shown on Map 11:

- Approximately 30.2 square miles, or 83 percent of the planning area, are located within the Root River watershed which is tributary to the Great Lakes-St. Lawrence River drainage system.

- The balance of the planning area—about 6 square miles—is located within the Des Plaines River watershed which is tributary to the Mississippi River drainage system.

Map 9

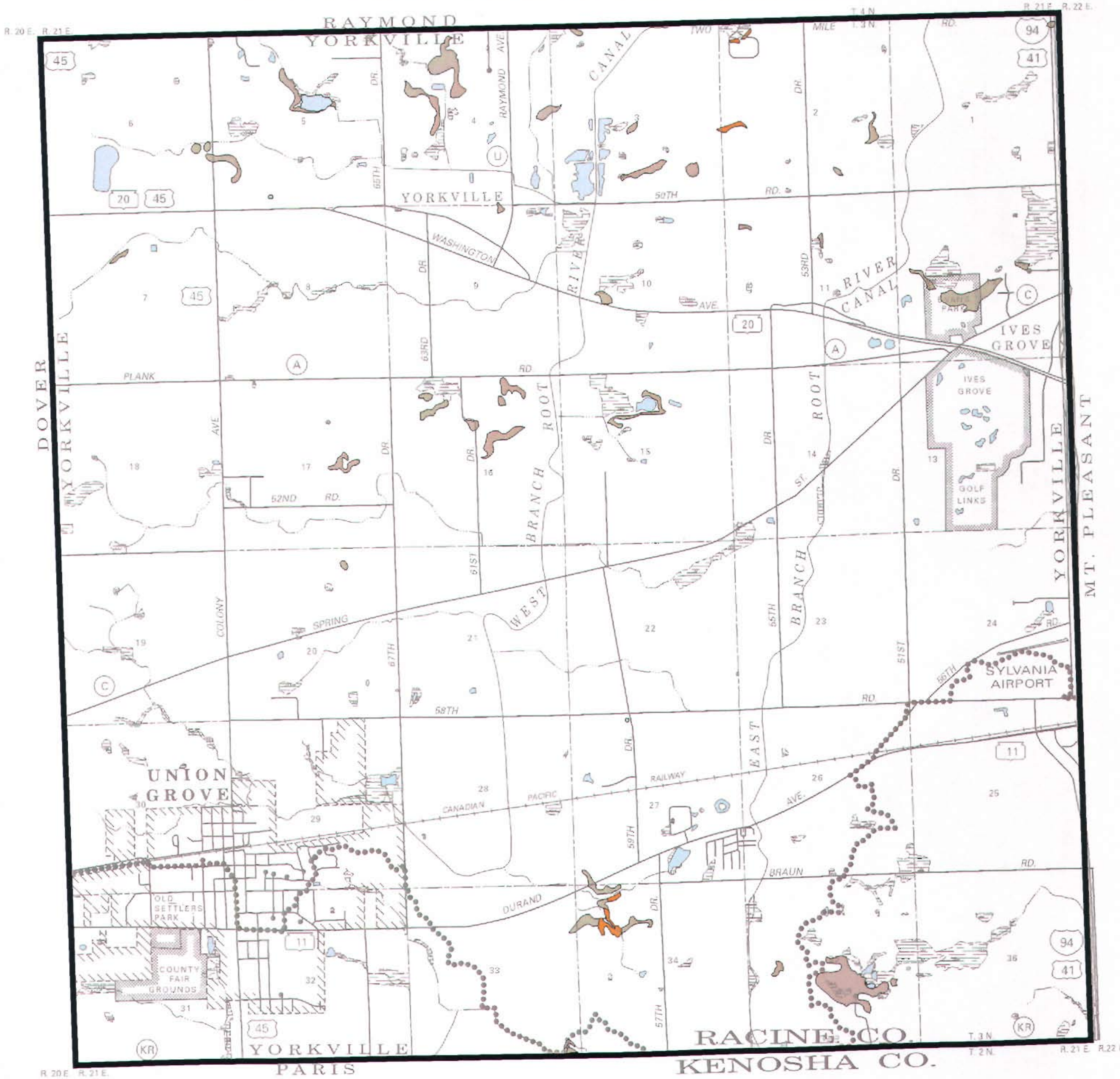
AGRICULTURAL SOIL CAPABILITY IN THE UNION GROVE/YORKVILLE PLANNING AREA



Source: U.S. Natural Resources Conservation Service and SEWRPC.

Map 10

SLOPE ANALYSIS FOR THE UNION GROVE/YORKVILLE PLANNING AREA



SOILS HAVING SLOPES RANGING FROM 0 TO 12 PERCENT

SOILS HAVING SLOPES RANGING FROM 12 TO 20 PERCENT

SOILS HAVING SLOPES OF 20 PERCENT OR MORE

SURFACE WATER

GRAPHIC SCALE

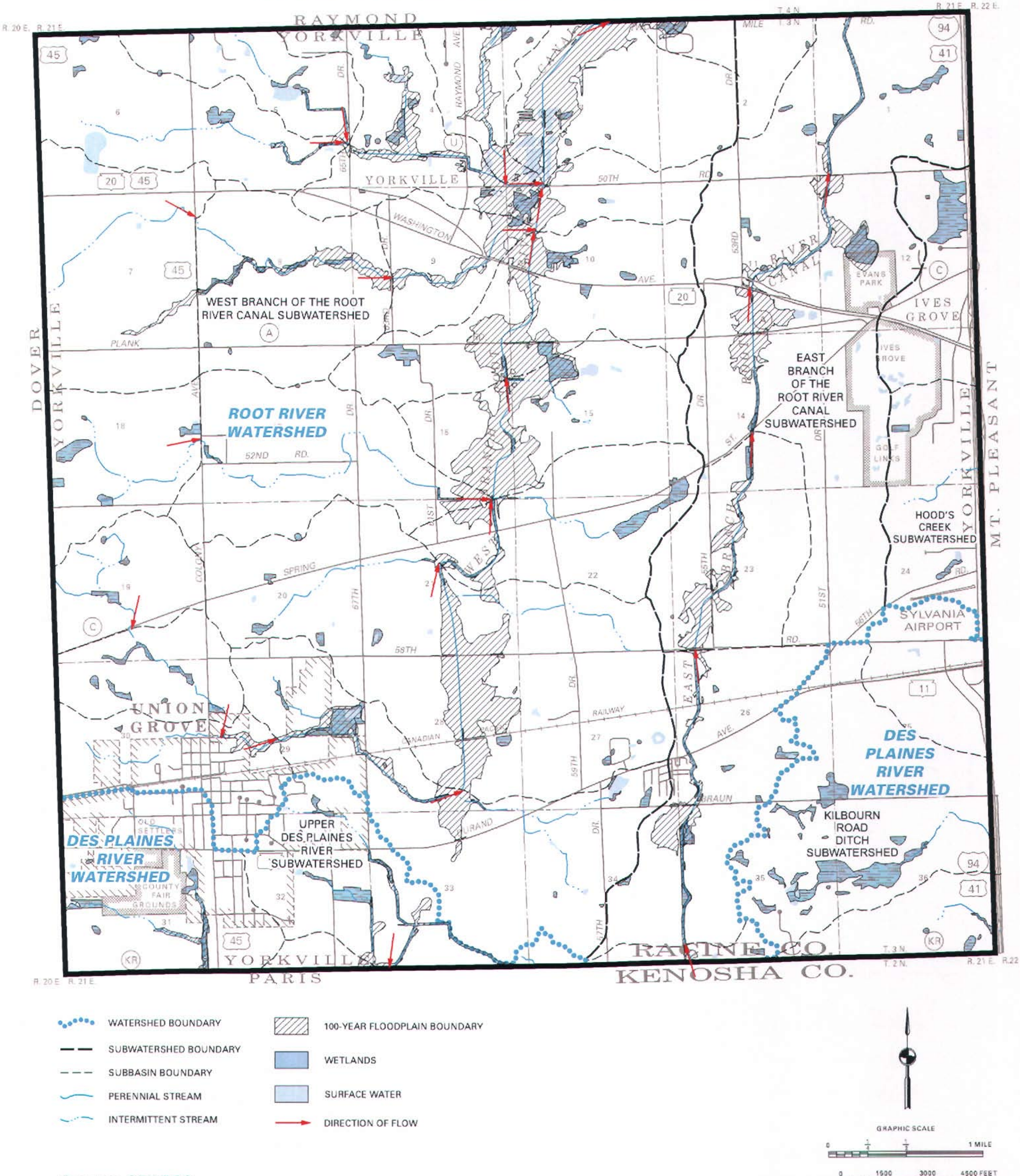
0 1/4 1/2 1 MILE

0 1500 3000 4500 FEET

Source: U.S. Natural Resources Conservation Service and SEWRPC.

Map 11

SURFACE DRAINAGE, WETLANDS, FLOODLANDS, AND WATERSHED FEATURES IN THE UNION GROVE/YORKVILLE PLANNING AREA



Source: SEWRPC.

- These watersheds are divided into subwatersheds, which, in turn, are further subdivided into individual drainage areas, termed subbasins.

SURFACE WATER RESOURCES

Surface water resources, consisting of lakes, rivers and streams, and associated floodlands and wetlands, form a particularly important element of the natural resource base of the Union Grove/Yorkville planning area. The presence of floodlands and wetlands and the regulations enacted to protect these resources are important determinants of the location and intensity of both rural and urban development in the planning area.

Lakes and streams are readily susceptible to degradation through improper rural, as well as urban, land use development and management. Water quality can be degraded by excessive pollutant loads, from malfunctioning and improperly located onsite sewage disposal systems, urban runoff, runoff from construction sites, and careless agricultural practices. The water quality of lakes and streams may also be adversely affected by the excessive development of riverine areas combined with the filling of peripheral wetlands, which removes valuable nutrient and sediment traps.

Lakes

Lakes have been classified by the Regional Planning commission as being either major or minor. Major lakes have 50 acres or more of surface water area; minor lakes have less than 50 acres of surface water area. As shown on Map 11:

- There are no major or minor lakes in the planning area.

- There are a limited number of smaller lakes and ponds in the planning area.

Streams

Perennial streams are defined as watercourses that maintain, at a minimum, a small continuous flow throughout the year except under unusual drought conditions. As shown on Map 11, the perennial streams in the Union Grove/Yorkville planning area are:

- The West Branch of the Root River Canal, which traverses the central portion of the planning area in a north-south direction.

- The East Branch of the Root River Canal which traverses the eastern portion of the planning area in a north-south direction.

- Two unnamed streams tributary to the West Branch of the Root River Canal.

- The headwaters of the Des Plaines River in the south central portion of the planning area.

- An unnamed stream in the southeastern portion of the planning area tributary to the Kilbourn Road Ditch.

Floodlands

The floodlands of a river or stream are the wide, gently sloping areas usually lying on both sides of a river or stream channel. The flow of a river onto its floodlands is a normal phenomenon and, in the absence of costly structural flood control works, can be expected to occur periodically.

For planning and regulatory purposes, floodlands are normally defined as those areas, excluding the stream channel, subject to inundation by the 100-year recurrence interval flood event. This is the event that may be expected to be reached or exceeded in severity once in every 100 years; or, stated another way, there is a

1 percent chance of this event being reached or exceeded in severity in any given year. Floodland areas are generally not well suited to urban development, not only because of the flood hazard, but also because of the presence of high water tables and soils poorly suited to urban uses. The floodland areas, however, generally contain important elements of the natural resource base, such as woodlands, wetlands, and wildlife habitat, and thus constitute prime locations for needed park and open space areas. Every effort should be made to discourage incompatible urban development on floodlands while encouraging compatible park and open space uses.

The identification of the 100-year recurrence interval flood hazard areas in the planning area is important for the preparation of a sound land use plan. Floodland delineations were prepared by the Regional Planning Commission as part of its Root River watershed planning program, the findings and recommendations of which are set forth in SEWRPC Planning Report No. 9, *A Comprehensive Plan for the Root River Watershed*, 1966. In addition, the Federal Emergency Management Agency (FEMA) has identified additional areas in the planning area that may be subject to flood hazards. The FEMA study was conducted for flood insurance purposes. Floodlands in the Union Grove/Yorkville planning area as currently delineated by the Regional Planning Commission and FEMA are shown on Map 11. These floodlands encompass an area of about 2.5 square miles, or about 7 percent of the planning area. These floodlands are located along the East and West Branches of the Root River Canal and the Des Plaines River.

Wetlands

Wetlands are areas in which the water table is at, near, or above the land surface and which are characterized by both hydric soils and by the growth of sedges, cattails, and other wetland vegetation. Wetlands generally occur in depressions and near the bottom of slopes, particularly along lakeshores and stream banks, and on large land areas that are poorly drained. Wetlands may, however, under certain conditions, occur on slopes and even on hilltops.

Wetlands perform an important set of natural functions. The functions include support of a wide variety of desirable, and sometimes unique, forms of plant and animal life; stabilization of lake levels and streamflows; entrapment and storage of plant nutrients in runoff, thus reducing the rate of enrichment of surface waters and weed and algae growth; contribution to the atmospheric oxygen and water supplies; reduction in stormwater runoff by providing areas for floodwater impoundment and storage; protection of shorelines from erosion; entrapment of soil particles suspended in runoff and reduction in stream sedimentation; provision of groundwater recharge and discharge areas; and provision of opportunities for certain scientific, education, and recreational pursuits.

Wetlands have severe limitations for residential, commercial, and industrial development. Generally, these limitations are due to the erosive character, high compressibility and instability, low bearing capacity, and high shrink-swell potential of wetland soils, as well as the associated high water table. If ignored in land use planning and development, those limitations may result in flooding, wet basements, unstable foundations, failing pavement, and excessive infiltration of clear water into sanitary sewers. In addition, there is significant onsite preparation and maintenance costs associated with the development of wetland soils, particularly as related to roads, foundations, and public utilities.

Recognizing the important natural functions of wetlands areas, continued efforts should be made to protect these areas by discouraging costly, both in monetary and environmental terms, wetland draining, filling, and urbanization.

Map 11 shows the location of wetlands existing in the Union Grove/Yorkville planning area in 1995. Wetlands occupied about 0.8 square mile, or about 2 percent of the planning area in 1995.

WOODLANDS

Under good management, woodlands can serve a variety of beneficial functions. In addition to contributing to clean air and water and regulating surface water runoff, the woodlands contribute to the maintenance of a diversity of plant and animal life in association with human life. Unfortunately, woodlands which required a century or more to develop, can be destroyed through mismanagement in a comparatively short time. The destruction of woodlands, particularly on hillsides, can contribute to stormwater runoff, the siltation of lakes and streams, and the destruction of wildlife habitat. Woodlands can and should be maintained for their total values—for scenery, wildlife habitat, open space, education, recreation, and air and water quality protection.

Woodlands occupied about 1.3 square miles, or about 4 percent of the Union Grove/Yorkville planning area, in 1995. The distribution of these woodlands is shown on Map 12. Woodlands occur in a scattered pattern throughout the planning area.

PRAIRIE VEGETATION

Prairies are open, generally treeless, areas in the landscape that are dominated by native grasses. Such areas have important ecological and scientific values. Two known prairies lie within the Union Grove/Yorkville planning area. As shown on Map 14, these are the Ives Grove Prairie Remnant, an approximately one-acre site located in U.S. Public Land Survey Section 13; and the Union Grove Railroad Prairie, consisting of five sites, having a combined area of about 48 acres, located along the Canadian Pacific Railway right-of-way.

WILDLIFE HABITAT AREAS

Wildlife in the Union Grove/Yorkville planning area includes species such as rabbit, squirrel, woodchuck, mink, fox, and raccoon, and whitetail deer; game birds including pheasant; and marsh furbearers such as muskrat and beaver. Bird life also includes songbirds, marsh birds and shorebirds, and waterfowl. The spectrum of wildlife species has undergone significant alterations since settlement of the area by Europeans. These alterations were the direct result of land use changes including the clearing of forests and the draining of wetlands for agricultural purposes and urban development.

In 1985, the Regional Planning Commission and the Wisconsin Department of Natural Resources cooperatively conducted an inventory of wildlife habitat in Southeastern Wisconsin. As part of that inventory, areas were evaluated in terms of the diversity of animal species, the territorial requirements of those species, the composition and structure of existing vegetation, proximity to other wildlife habitat areas, and level of disturbance by man's activities. As part of the inventory, three classes of wildlife habitat were identified:

- Class I, which consists of areas that contain a good diversity of wildlife, that are of sufficient size to meet all of the habitat requirements for each species, and that are generally located in proximity to other wildlife habitat areas.

- Class II, which consists of wildlife habitat areas lacking one of the three criteria necessary for a Class I designation.

- Class III, which consists of those wildlife habitat areas that are generally remnant in nature and that lack two of the three criteria necessary for Class I designation.

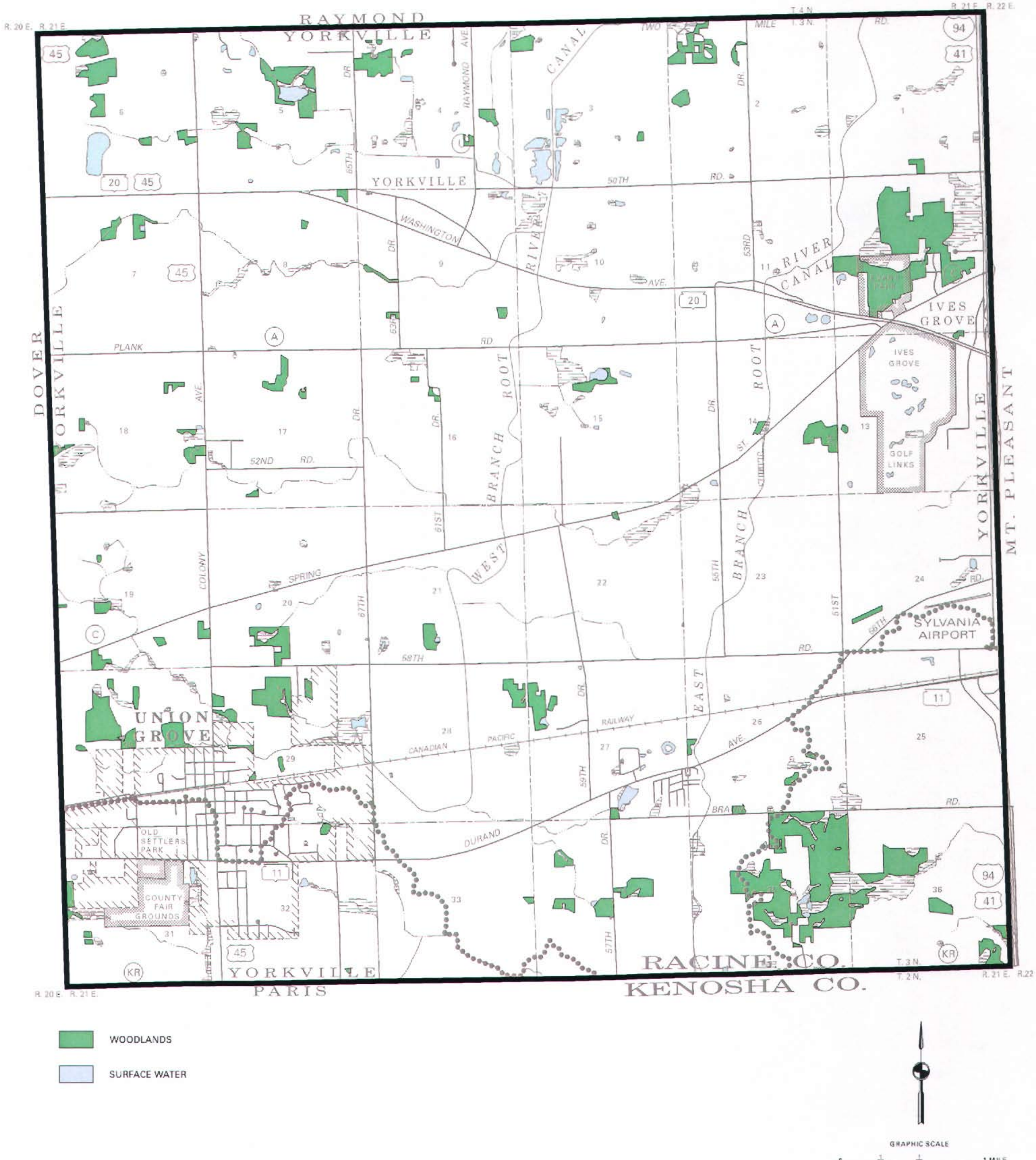
As shown on Map 13:

- Wildlife habitat areas in the Union Grove/Yorkville planning area generally occur in association with existing surface water, wetland, and woodland resources.

- In 1985, wildlife habitat areas occupied about 3.2 square miles, or about 9 percent of the planning area.

Map 12

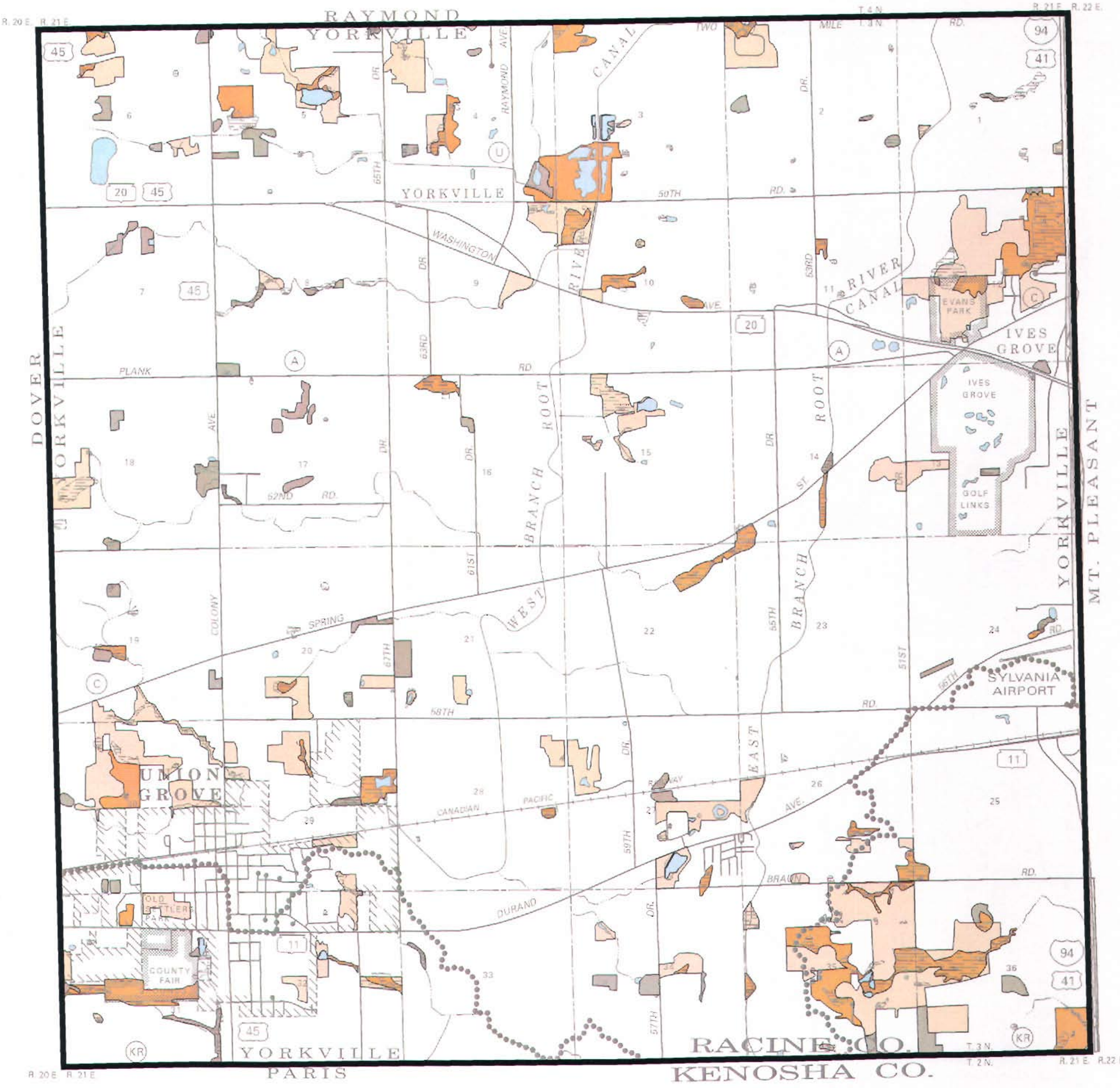
WOODLANDS IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1995



Source: SEWRPC.

Map 13

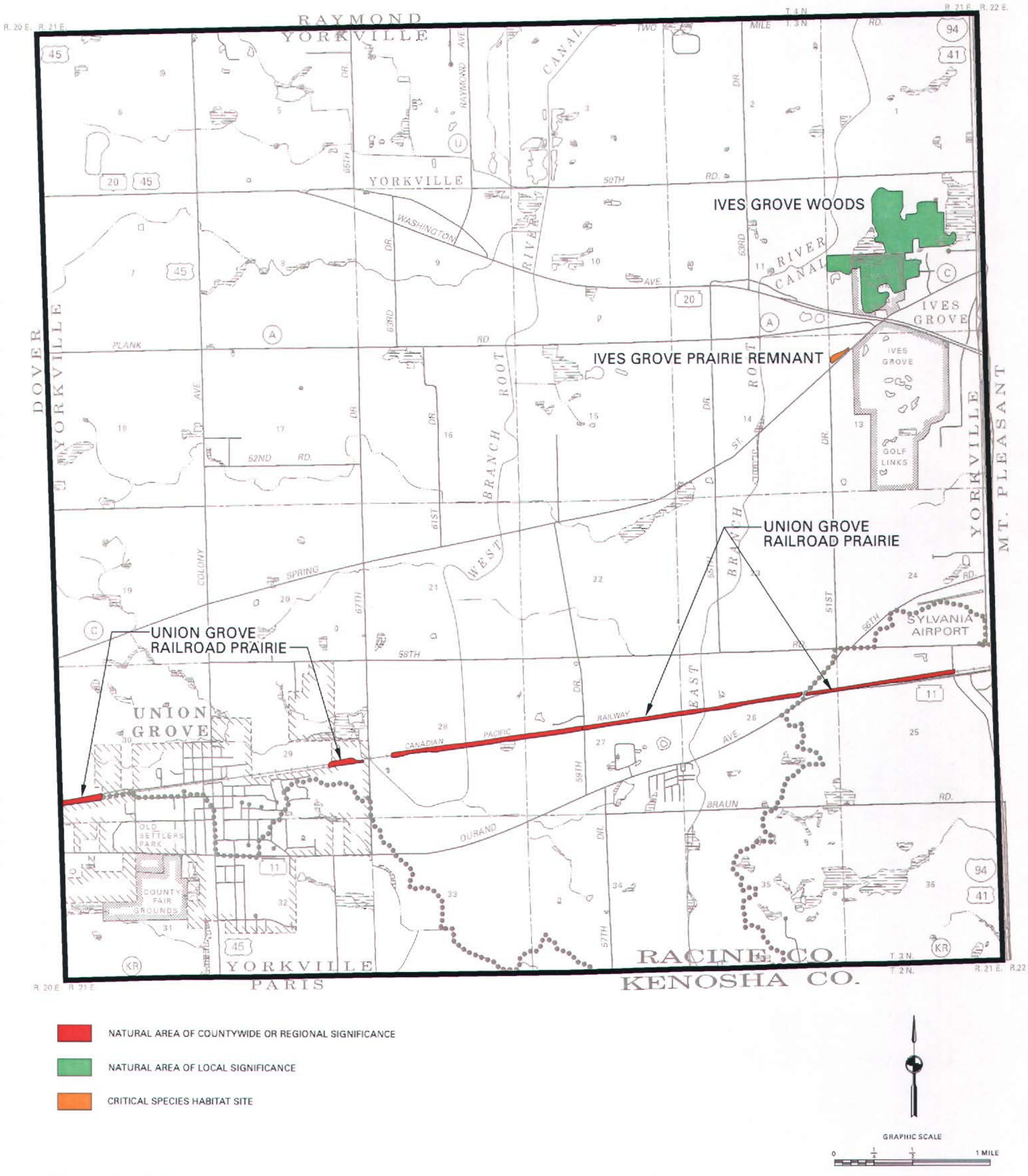
WILDLIFE HABITAT IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1985



Source: SEWRPC.

Map 14

NATURAL AREAS IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1995



Source: SEWRPC.

- Of this total area, Class I wildlife habitat area, comprised about 1.0 square mile, or about 31 percent; Class II wildlife habitat comprised about 1.8 square miles, or about 56 percent; and Class III wildlife habitat, comprised about 0.4 square mile, or about 13 percent.

- Class I, Class II, and Class III wildlife habitat occur in scattered locations throughout the Union Grove/Yorkville planning area.

NATURAL AREAS AND CRITICAL SPECIES HABITAT SITES

A comprehensive inventory of natural resources in the Southeastern Wisconsin Region was conducted by the Regional Planning Commission in 1994 as part of the regional natural areas and critical species habitat protection and management study. The inventory systematically identified all remaining high-quality natural areas, critical species habitat, and sites having geological significance within the Region. Inventory findings as they pertain to the Union Grove/Yorkville planning area are summarized herein.

Natural Areas

Natural areas are tracts of land or water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the landscape before European settlement. Natural areas sites are classified into one of three categories: natural areas of statewide or greater significance, natural areas of countywide or regional significance, and natural areas of local significance. Classification of an area into one of these three categories is based upon consideration of the diversity of plant and animal species and community types present; the structure and integrity of the native plant or animal community; the extent of disturbance from human activity, such as logging, agricultural use, and pollution; the commonness of the plant and animal community; any unique natural feature; the size of the site; and the educational value.

Two such sites have been identified in the Union Grove/Yorkville planning area. These sites, as shown on Map 14, are:

- The Ives Grove Woods, an approximately 164-acre site located in U.S. Public Land Survey Section 12; and

- The Union Grove Railroad Prairie, an approximately 48-acre site located along the Canadian Pacific Railway right-of-way in the southern portion of the planning area.

Critical Species Habitat Sites

Critical species habitat sites are those areas, outside of natural areas, where the chief value lies in their ability to support rare, threatened, or endangered species. Such areas constitute "critical" habitat that is important to ensure survival of a particular species or group of species of special concern.

One site supporting threatened or rare plant and animal species has been identified in the Union Grove/Yorkville planning area. This site, the Ives Grove Prairie Remnant, encompasses an area of about one acre, is located in U.S. Public Land Survey Section 13, as shown on Map 14.

RESOURCE-RELATED ELEMENTS

Park and open space sites while not strictly defined as part of the natural resource base, are closely linked to the underlying natural resource base. Park and open space sites may be enhanced by the presence of natural resource features; conversely, the commitment of land to park and open space use contributes to the preservation of existing resource features.

Existing Outdoor Recreation and Open Space Sites
Existing outdoor recreation and open space sites in the Union Grove/Yorkville planning area were inventoried in 1998. As shown on Map 15 and indicated in Table 15:

- The 19 sites in the planning area together encompass a total area of about 774 acres, or about 2 percent of the planning area.
- The Ives Grove Golf Links, owned by Racine County, constitutes the largest site in the planning area, encompassing about 340 acres.
- Of the 19 sites identified, 10 are located in the Village of Union Grove, and nine are located in the Town of Yorkville.

Recreational Trails
Racine County has developed bicycling facilities throughout the County, including a six-mile segment of the 100-mile "on-the-road" Racine County bicycle route located in the southern portion of the planning area (see Map 15).

ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS

One of the most important tasks completed under the regional planning program for Southeastern Wisconsin has been the identification and delineation of those areas in the Region in which concentrations of the best remaining elements of the natural resource base occur. It was recognized that preservation of such areas is essential both to the maintenance of the overall environmental quality of the Region and to the continued provision of the amenities required to maintain a high quality of life for the resident population.

Under the regional planning program, seven elements of the natural resource base have been considered essential to the maintenance of both the ecological balance as well as the overall quality of life in the Region: 1) lakes, rivers, and streams and the associated shorelands and floodlands; 2) wetlands; 3) woodlands; 4) prairies; 5) wildlife habitat areas; 6) wet, poorly drained, and organic soils; and 7) rugged terrain and high relief topography. In addition, there are certain other features which, although not strictly a part of the natural resource base, are closely related to, or centered on, that base and are a determining factor in identifying and delineating areas with recreational, aesthetic, ecological, and cultural value. These features include 1) existing park and open space sites; 2) potential park and open space sites; 3) historic sites; 4) scenic areas and vistas; and 5) and natural area sites.

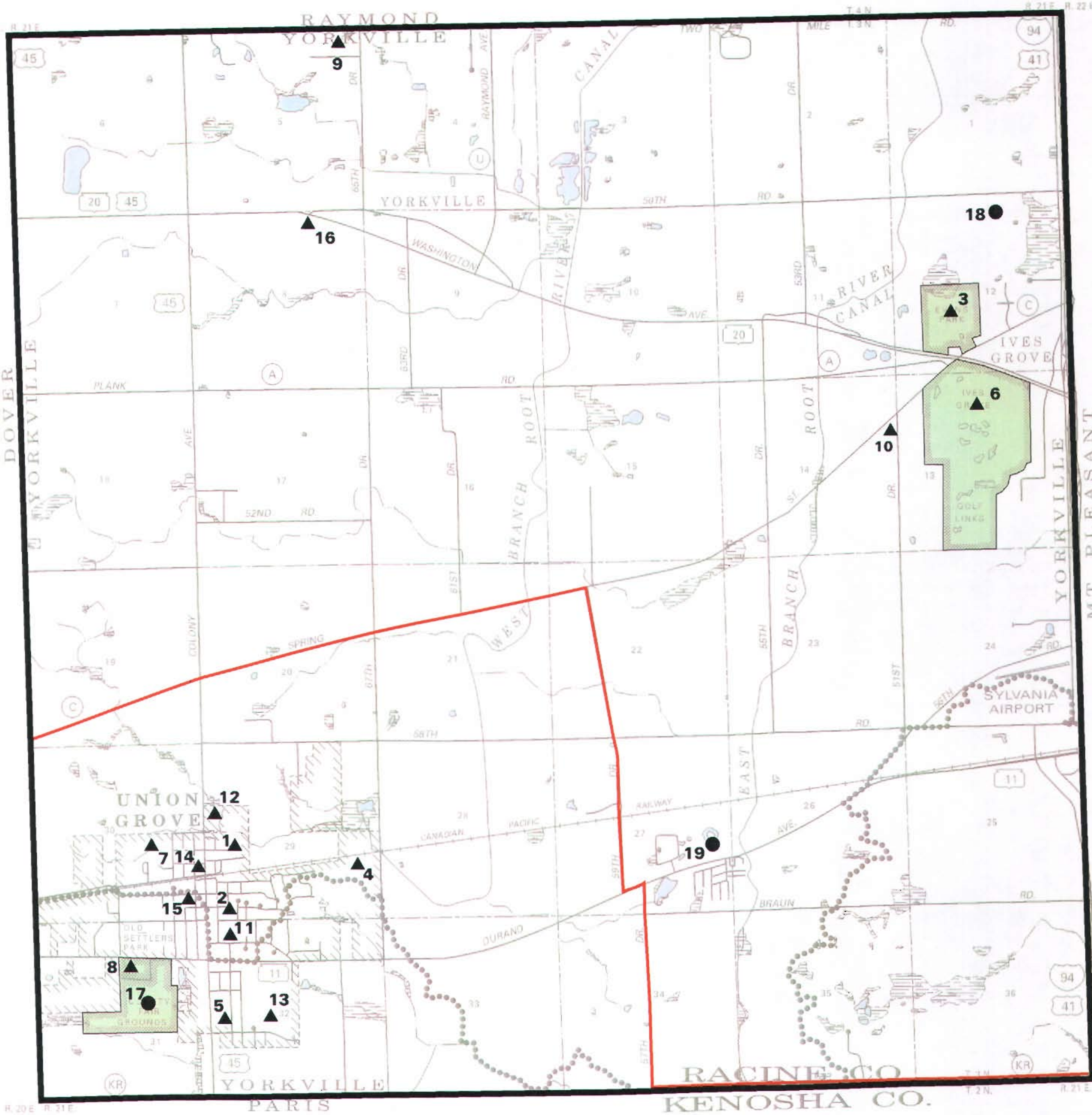
The delineation of these 12 natural resource and natural resource-related elements on maps results in a concentration of such elements in an essentially linear pattern of relatively narrow, elongated areas which have been termed "environmental corridors" by the Regional Planning Commission.

The environmental corridors of the Union Grove/Yorkville planning area were delineated based upon resource content and size as follows:

- Primary environmental corridors include areas that are at least 400 acres in size, two miles in length, and 200 feet in width.
- Secondary environmental corridors include areas that are at least 100 acres in size and one mile in length.
- Isolated natural resource areas have a minimum size of five acres. Isolated natural resource areas are generally separated physically from primary and secondary environmental corridors by intensive urban or agricultural land uses.

Map 15

EXISTING PARK AND OPEN SPACE SITES IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1998



▲ PUBLICLY-OWNED PARK AND OPEN SPACE SITE

● PRIVATELY-OWNED PARK AND OPEN SPACE SITE

10 SITE NUMBER (SEE TABLE 15)

RACINE COUNTY BICYCLE TRAIL

GRAPHIC SCALE

0 ¼ ½ 1 MILE

0 1500 3000 4500 FEET

Source: SEWRPC.

Table 15

EXISTING PARK AND OPEN SPACE SITES IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1998

Site Name	Number on Map 15	Acreage	Facilities
Public			
American Legion Memorial Park	1	11	Softball diamond, playground
Bufton Park	2	1	Playfield, playground
Evans Park	3	66	Picnic area, trails
Groves Subdivision Park	4	3	Undeveloped
Indian Trail Park	5	1	Playground
Ives Grove Golf Links	6	341	Golf Course
Joseph Leider Memorial Park	7	3	Softball diamond, playground
Old Settlers Park	8	13	Picnic area, playfield
Raymond District School	9	1	Playfield
Skewes Memorial Park	10	4	Picnic area
Union Grove Grade School	11	5	Softball diamond, playground
Union Grove High School	12	17	Baseball/softball diamond, football
Union Grove Middle School	13	9	Baseball/softball diamond
Village Square	14	1	- -
Well No. 3 Park	15	1	Playfield, playground
Yorkville School	16	66	Playground, softball diamond
Subtotal	16 sites	543	- -
Nonpublic			
Racine County Fairgrounds	17	85	- -
Racine Instinctive Bowmen Club	18	80	- -
Wisconsin Sportsmen's Association Recreation Area	19	24	Trap shooting
Subtotal	3 sites	189	- -
Total	19 sites	732	- -

Source: SEWRPC.

The preservation of the environmental corridors in essentially natural, open uses can assist in flood-flow attenuation, water pollution abatement, noise pollution abatement, and air quality maintenance. Such corridor preservation is also essential to facilitate the movement of wildlife, especially in times of stress, and for the movement and dispersal of seeds for a variety of plant species. In addition, because of the many interacting relationships which exist between living organisms and their environment, the destruction or deterioration of one important element of the total environment may lead to a chain reaction of deterioration and destruction of other elements. The drainage of wetlands, for example, may destroy fish spawning areas, wildlife habitat, groundwater recharge areas, and natural filtration and floodwater storage areas of interconnecting stream systems. The resulting deterioration of surface water quality may, in turn, lead to a deterioration of the quality of groundwater. Similarly, destruction of ground cover may result in soil erosion, stream siltation, more rapid run-off, and increased flooding, as well as the destruction of wildlife habitat. Although the effects of any one of these environmental changes may not by itself be overwhelming, the combined effects may eventually lead to a serious deterioration of the underlying and sustaining natural resource base and of the overall quality of the environment for life. In addition, the intrusion of intensive urban land uses into such areas may result in the creation of serious and costly problems, such as failing foundations for pavements and structures, wet basements, excessive operation of sump pumps, excessive clear water infiltration into sanitary sewerage systems, and poor drainage. The need to maintain the integrity of the remaining environmental corridors and isolated natural resource areas in Southeastern Wisconsin should, thus, be apparent.

Primary Environmental Corridors
As shown on Map 16, there are no primary environmental corridors located in the planning area.

Secondary Environmental Corridors
As shown on Map 16, four secondary environmental corridors are generally located along the perennial streams within the planning area. Together, these areas encompass a total of about 1.8 square miles, or about 5 percent of the planning area.

Isolated Natural Resource Areas
Isolated natural resource areas in the planning area consist largely of smaller pockets of wetlands or woodlands. As shown on Map 16, 34 such areas are scattered throughout the planning area. In combination, these areas together occupied about 0.9 square mile, or about 2 percent of the planning area.

SUMMARY

This chapter has presented the results of an inventory and analysis of the natural resource base of the Union Grove/Yorkville planning area undertaken in support of the preparation of a land use plan for the planning area. The major findings of that inventory and analysis are described below.

1. Soil limitations for various urban and nonurban uses are an important consideration in any sound land use planning effort. Detailed soil survey data indicate that about 12.6 square miles, or about 35 percent of the Union Grove/Yorkville planning area, are covered by soils that have severe limitations for residential development served by public sanitary sewer service, or stated differently, are poorly suited for residential development of any kind. With respect to unsewered development, the soil survey data indicate that about 35.6 square miles, or about 98 percent of the planning area, are covered by soils classified as unsuitable for use of conventional onsite sewage disposal systems; and about 19 square miles, or about 53 percent, are classified as unsuitable for mound type systems.

2. The planning area is located within the Des Plaines and Root River watersheds. About 2.5 square miles, or 7 percent of the planning area, lie within the 100-year recurrence interval flood hazard areas of streams in these watersheds.

3. The planning area encompasses a number of significant natural resource base features including wetland areas which in 1995 occupied about 0.8 square mile, or about 2 percent of the planning area; woodlands which in 1995 occupied about 1.3 square miles, or about 4 percent of the planning area; and wildlife habitat areas which in 1985 occupied about 3.2 square miles, or about 9 percent of the planning area. The planning area in 1995 also contained two sites identified as natural areas.

4. The planning area contains 19 outdoor recreation and open space sites, the largest of which is the Ives Grove Golf Links encompassing about 340 acres.

5. The most important elements of the natural resource base and features closely related to that base—including wetlands, woodlands, prairie, wildlife habitat, major lakes and streams and associated shorelands and floodlands, and outdoor recreation sites—when combined, result in an essentially linear pattern in the planning area referred to as environmental corridors. Secondary environmental corridors include a wide variety of important natural resource and resource related elements and are, by definition, at least 100 acres in size and one mile long. In 1995, secondary environmental corridors in the planning area encompass a total of about 1.8 square miles, representing about 5 percent of the planning area.

Map 16

ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1995

NONE PRIMARY ENVIRONMENTAL CORRIDOR

SECONDARY ENVIRONMENTAL CORRIDOR

ISOLATED NATURAL RESOURCE AREA

SURFACE WATER

GRAPHIC SCALE

0 ¼ ½ 1 MILE

0 1500 3000 4500 FEET

Source: SEWRPC.

Chapter IV

MAN-MADE ENVIRONMENT

INTRODUCTION

Whereas the previous chapter of this report presented a description of the natural resource base of the Union Grove/Yorkville planning area, this chapter provides a description of the man-made environment of the area. Specifically, this chapter presents information regarding the existing land use pattern and changes in that pattern over the past three decades; the existing transportation system; and the existing utility and community facilities systems. Definitive information regarding existing land use and other related aspects of the man-made environment is essential to any sound land use planning effort.

EXISTING LAND USE

The Regional Planning Commission periodically conducts inventories of existing land use in the Southeastern Wisconsin Region, providing definitive information on the type, amount, and spatial location of the major categories of land use within the Region. The first such inventory was conducted in 1963; the most recent inventory was conducted in 1995. The existing land use pattern in the Union Grove/Yorkville planning area, based upon the 1995 land use inventory, is shown on Map 17 and is quantitatively summarized in Table 16. The trend in land use development for the period from 1963 through 1995 is presented for the planning area in Table 17.

As shown on Map 17:

- Existing urban development within the Union Grove/Yorkville planning area includes two relatively densely developed areas, one in the Village of Union Grove and the other in the old settlement of Ives Grove.
- The planning area encompasses a number of environmentally significant wetland and woodland areas.
- Despite the scattering of residential homesites that exist within the Town of Yorkville, the Town still contains a number of intact "blocks" of farmland.

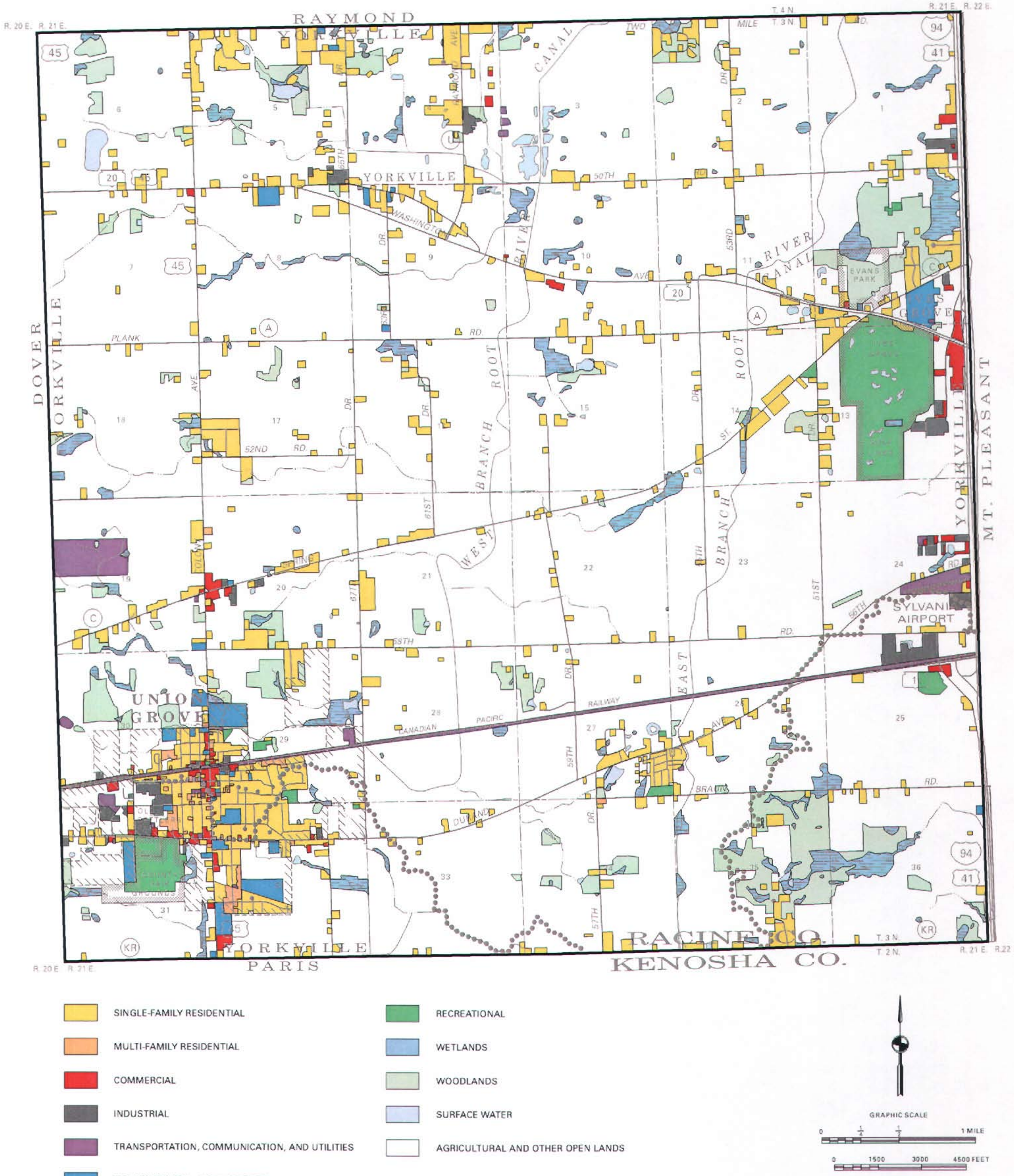
Urban Land Uses

As shown on Map 17, and indicated in Tables 16 and 17:

- In 1995, urban land uses—consisting of residential, commercial, industrial, governmental and institutional, recreational, and transportation uses—encompassed about 3,330 acres, or about 14 percent of the Union Grove/Yorkville planning area.

Map 17

EXISTING LAND USE IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1995



Source: SEWRPC.

Table 16

EXISTING LAND USE IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1995

Land Use Category[a]	Village of Union Grove			Town of Yorkville			Planning Area		
	Acres	Percent of Urban/ Nonurban	Percent of Total	Acres	Percent of Urban/ Nonurban	Percent of Total	Acres	Percent of Urban/ Nonurban	Percent of Total
Urban									
Residential	287	50.5	30.3	1,053	38.1	4.7	1,340	40.3	5.8
Commercial	26	4.6	2.8	74	2.7	0.3	100	3.0	0.4
Industrial	34	6.0	3.6	102	3.7	0.5	136	4.1	0.6
Transportation, Communication and Utilities	148	26.0	15.6	1,070	38.8	4.8	1,218	36.6	5.3
Governmental and Institutional	63	11.1	6.7	87	3.2	0.4	150	4.5	0.6
Recreational	10	1.8	1.0	374	13.5	1.7	384	11.5	1.7
Subtotal	568	100.0	60.0	2,760	100.0	12.4	3,328	100.0	14.4
Nonurban									
Agricultural	315	83.1	33.3	17,459	89.7	78.5	17,774	89.5	76.7
Natural Areas									
Woodlands	14	3.7	1.5	864	4.4	3.9	878	4.4	3.8
Wetlands	10	2.6	1.0	504	2.6	2.3	514	2.6	2.2
Surface Water	- -	- -	- -	134	0.7	0.6	134	0.7	0.6
Subtotal	24	6.3	2.5	1,502	7.7	6.8	1,526	7.7	6.6
Unused Land	40	10.6	4.2	507	2.6	2.3	547	2.8	2.3
Subtotal	379	100.0	40.0	19,468	100.0	87.6	19,847	100.0	85.6
Total	947	- -	100.0	22,228	- -	100.0	23,175	- -	100.0

[a]Parking is included with the associated use.

Source: SEWRPC.

- Lands devoted to these urban uses increased by about 1,560 acres, or about 88 percent, between 1963 and 1995.

- Residential land uses comprised the largest urban land use category, encompassing about 1,340 acres, or about 40 percent of all urban land, and about 6 percent of the planning area. Residential lands occurred both in concentrated enclaves—as noted above—and as scattered homesites in many parts of the Town of Yorkville.

By 1998, 795 lots had been created through residential subdivision plats in the Union Grove/Yorkville planning area. Of this total, 545 lots, or about 69 percent, were platted in the Village of Union Grove, and 250 lots, or about 31 percent were platted in the Town of Yorkville.

Nonurban Land Uses
As shown on Map 17 and indicated in Tables 16 and 17:

- In 1995, nonurban land uses—consisting of agricultural lands, wetlands, woodlands, other open lands, and surface water—comprised about 19,850 acres, or about 86 percent of the planning area.

- Nonurban land uses decreased by about 1,560 acres, or by about 7 percent, between 1963 and 1995.

Table 17

LAND USE IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1963 AND 1995

Land Use Category[a]	Land Use (acres) 1963	Land Use (acres) 1995	Change in Land Use 1963-1995 Acres	Change in Land Use 1963-1995 Percent
Urban				
Residential	623	1,340	717	115.1
Commercial	29	100	71	244.8
Industrial	32	136	104	325.0
Transportation, Communication and Utilities	983	1,218	235	23.9
Governmental and Institutional	59	150	91	154.2
Recreational	41	384	343	836.6
Subtotal	1,767	3,328	1,561	88.3
Nonurban				
Agricultural	19,656	17,774	-1,882	-9.6
Natural Areas				
Woodlands	931	878	-53	-5.7
Wetlands	482	514	32	6.6
Surface Water	44	134	90	204.5
Subtotal	1,457	1,526	69	4.7
Extractive and Landfill	33	- -	-33	-100.0
Unused Land	262	547	285	108.8
Subtotal	21,408	19,847	-1,561	-7.3
Total	23,175	23,175	- -	- -

[a]Parking included in associated use.

Source: SEWRPC.

- Agricultural lands encompassed about 17,770 acres in the planning area in 1995, accounting for about 90 percent of all nonurban land and about 77 percent of the planning area.

- Woodlands, wetlands, and surface water together encompassed about 1,530 acres, or about 8 percent of all nonurban lands and about 7 percent of the planning area.

Of the 17,770 acres of farmland existing in the planning area in 1995, about 14,830 acres, or about 83 percent, were identified as prime farmland under the Racine County farmland preservation plan, adopted by the Racine County Board in 1982.[1] Under that plan, prime farmlands were identified as consisting of farm units meeting the following criteria: 1) individual farm unit must be at least 35 acres in size; 2) at least one-half of the individual farm unit must be covered by soils meeting U.S. Natural Resources Conservation Service criteria for prime farmland or farmland of statewide importance; and 3) the individual farm units must occur in a farming area of at least 100 acres in size. Map 18 shows those lands which were identified as prime agricultural land under the County farmland preservation plan prepared in 1982, and which still met the criteria and remained in agricultural use in 1995.

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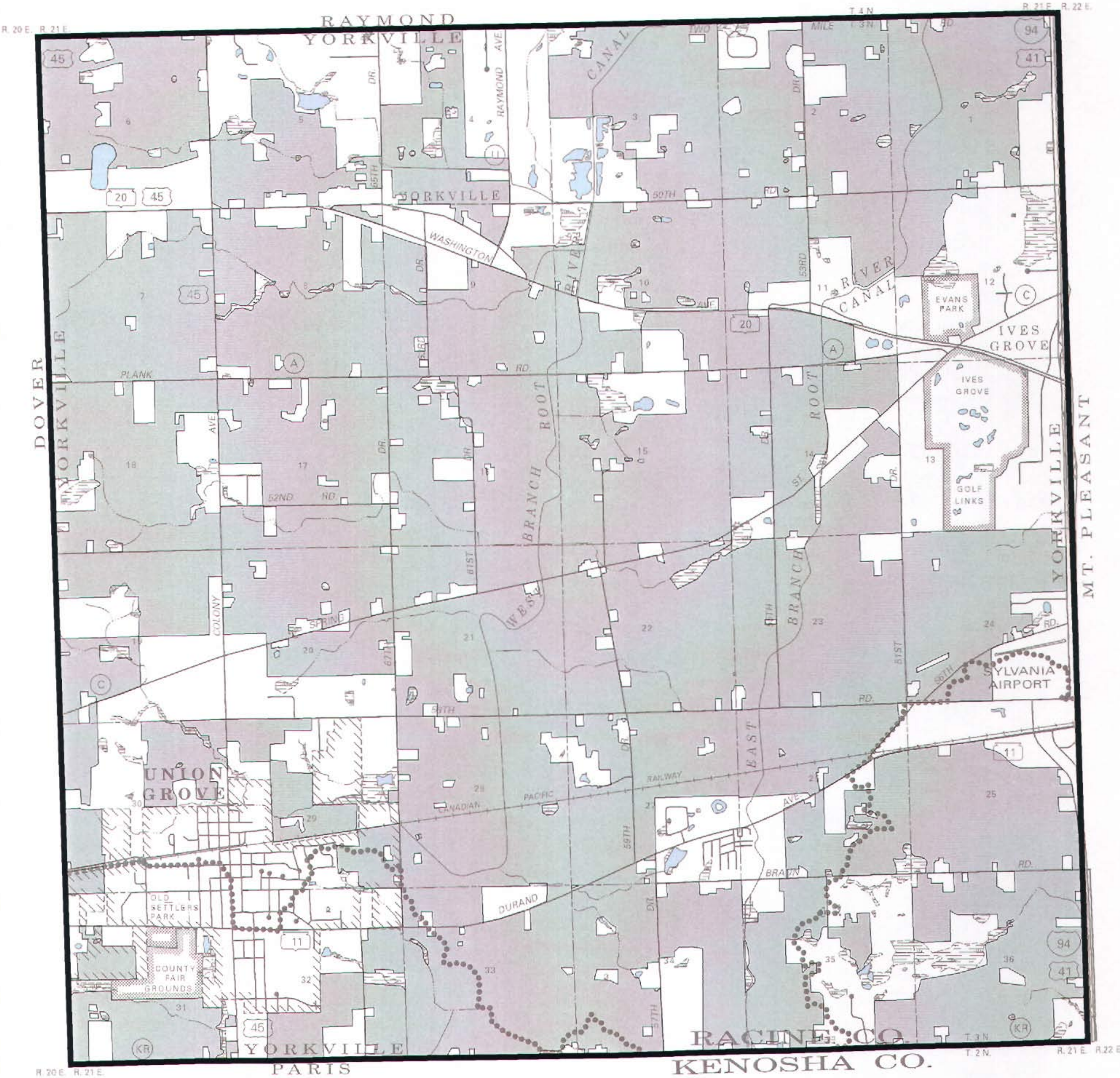
[1]*SEWRPC Community Assistance Planning Report No. 46,* A Farmland Preservation Plan for Racine County, Wisconsin, *1981.*

Map 18

PRIME AGRICULTURAL LANDS IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1995



PRIME AGRICULTURAL LANDS

OTHER LANDS

SURFACE WATER

GRAPHIC SCALE

0 1/4 1/2 1 MILE

0 1500 3000 4500 FEET

Source: SEWRPC.

TRANSPORTATION FACILITIES

Arterial Streets and Highways

Map 19 shows the street and highway system serving the planning area in 1999. As shown on Map 19:

- In 1999, the Union Grove/Yorkville planning area was served by a 112 mile network of streets and highways.

- Of this total, 49 miles, or about 43 percent, consisted of arterial streets and highways, all of which were under the jurisdiction of the County and State governments.

Freight Railway Facilities

As of 1999, local freight railway service was provided on an as needed basis between Kansasville and Sturtevant over a railway line located through the southern portion of the Union Grove/Yorkville planning area by the Canadian Pacific Railway. This railway connects to the main line of the Canadian Pacific Railway at Sturtevant. That mainline railway provided freight service in a corridor through Southeastern Wisconsin between Chicago and Minneapolis-St. Paul.

Airport Facilities

The Sylvania Airport is located in the Town of Yorkville adjacent to IH 94, north of STH 11. This airport is classified as a general aviation airport, that is, it is open to public use and is intended to serve all small single-engine and many of the smaller twin-engine aircraft. These aircraft typically seat from two to six people and are used for a wide variety of activities, including recreational and sport flying, training, agricultural purposes, and some business and charter flying.

Of particular importance to any planning for the area are the recommended improvements to the Sylvania Airport as set forth in the regional airport system plan.[2] As shown on Map 20, recommended improvements include:

- The construction of a new primary runway and parallel taxiway.

- The construction of a new crosswind runway.

- Land and easement acquisition to enable the needed airfield expansion.

- Relocation and expansion of the terminal and hangar facilities.

With these improvements, the airport would be able to serve larger twin-engine aircraft and would also allow the airport to function as a reliever airport for the other larger airports in the Region.

PUBLIC UTILITIES

Public utility systems are among the most important and permanent elements influencing the growth and development of a community. Moreover, certain utility facilities are closely linked to surface water and groundwater resources and may, therefore, affect the overall quality of the natural resource base. This is particularly true of sanitary sewerage, water supply, and stormwater drainage facilities, which are, in a sense, modifications or extensions of the natural lake, stream, and water course systems of an area and of the underlying groundwater reservoir. The provision of certain public utilities to a largely rural area is normally impractical. Conversely, the development of areas for intensive urban use without certain utilities may create serious and costly environmental and public health problems.

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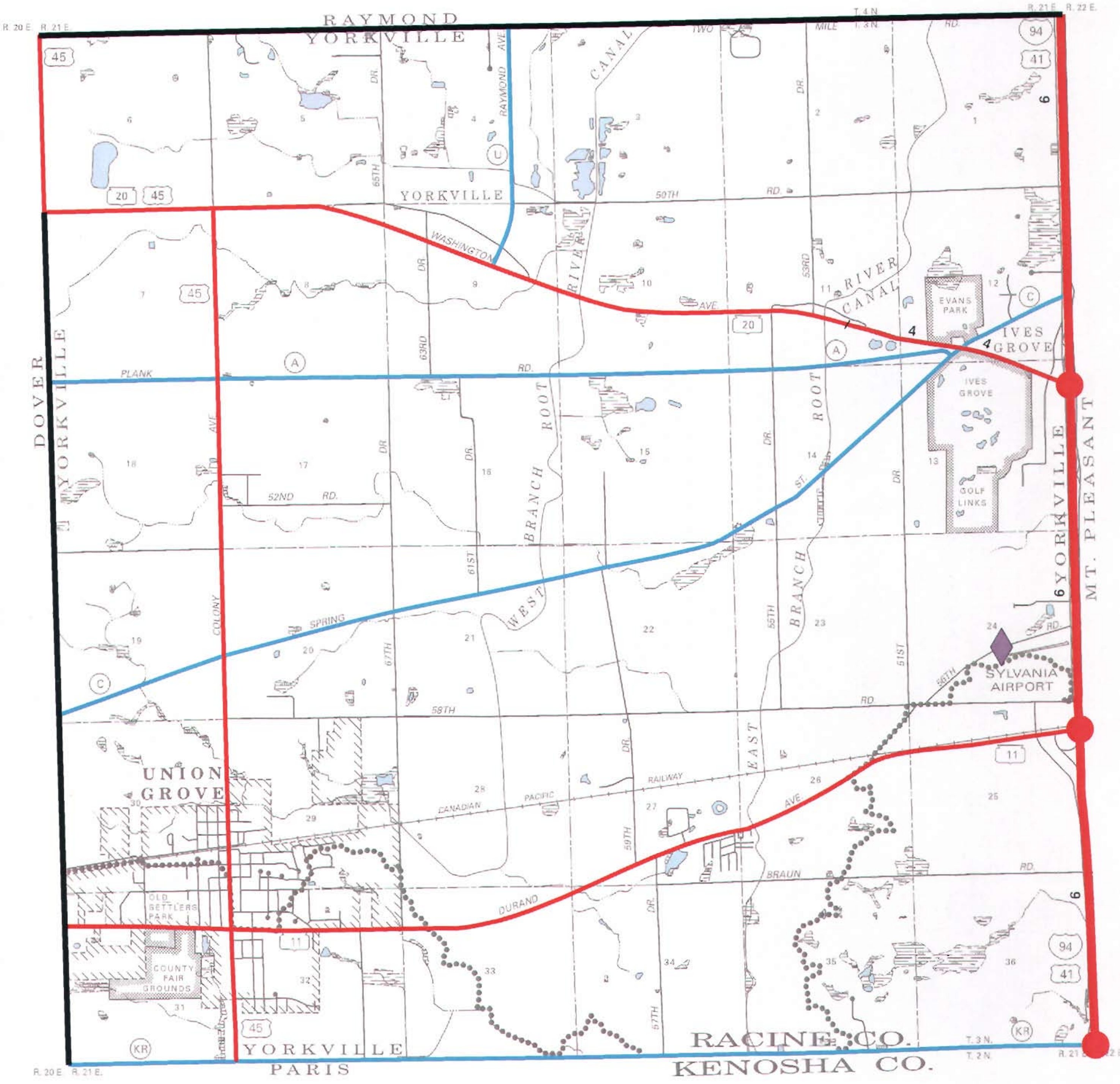
[2]*SEWRPC Planning Report No. 38 (2nd Edition),* A Regional Airport System Plan for Southeastern Wisconsin: 2010, *1996.*

Map 19

EXISTING ARTERIAL STREET AND HIGHWAY SYSTEM IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1999



FREEWAY

STATE TRUNK HIGHWAY

FREEWAY-NONFREEWAY INTERCHANGE

AIRPORT

ARTERIAL STREETS AND HIGHWAYS

STATE TRUNK HIGHWAY

COUNTY TRUNK HIGHWAY

NONE LOCAL TRUNK HIGHWAY

4 NUMBER OF TRAFFIC LANES (2 WHERE UNNUMBERED)

GRAPHIC SCALE

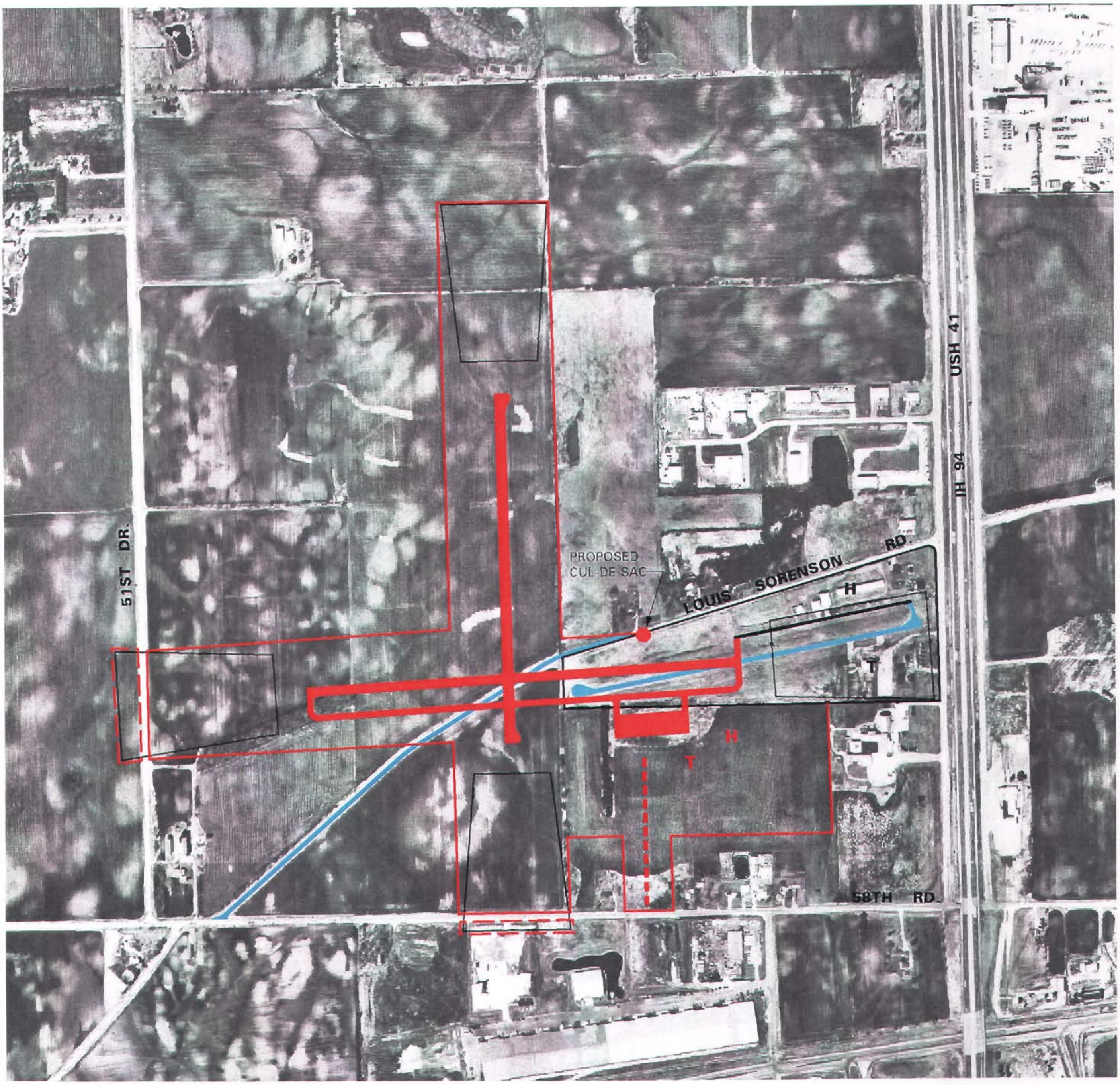
0 1/4 1/2 1 MILE

0 1500 3000 4500 FEET

Source: SEWRPC.

Map 20

RECOMMENDED SITE IMPROVEMENT PLAN FOR SYLVANIA AIRPORT: 2010



AIRPORT FEATURES

EXISTING	PROPOSED	
		PAVED RUNWAYS, TAXIWAYS, AND APRONS
		PROPERTY BOUNDARY
(NONE)		EASEMENT BOUNDARY
T	T	TERMINAL-ADMINISTRATION BUILDING
H	H	AIRCRAFT HANGAR
(NONE)		NEW ACCESS ROAD

FACILITIES TO BE REMOVED

PAVED RUNWAYS, TAXIWAYS, APRONS, AND ROAD TO BE REMOVED

RUNWAY PROTECTION ZONE

ULTIMATE RUNWAY PROTECTION ZONE AREA

GRAPHIC SCALE

0 400 800 1200 FEET

DATE OF PHOTOGRAPHY: 1995

Source: SEWRPC.

Sanitary Sewer Service

Village of Union Grove

Public sanitary sewer service within the Village of Union Grove became available upon the construction of the Village of Union Grove sewage treatment plant in 1937. A new plant was constructed in 1979 and expanded in 1994. In 1990, the Regional Planning Commission worked with the Village of Union Grove to complete a sewer service area plan which identified lands in the planning area anticipated to be tributary to this treatment plant. That plan is set forth in SEWRPC Community Assistance Planning Report No. 180, *Sanitary Sewer Service Area for the Village of Union Grove and Environs*. Map 21 shows the area served by the Village's sewage treatment plant in 1995, as well as the planned sewer service area.

Town of Yorkville

Public sanitary sewer service within the Town of Yorkville became available in the Ives Grove area upon the construction of the Yorkville Sewer Utility District No. 1 sewage treatment plant in 1965. The plant was upgraded in 1972 and 1983. SEWRPC Planning Report No. 30, *A Regional Water Quality Management Plan for Southeastern Wisconsin: 2020*, completed in 1979, identifies a general planned sewer service area tributary to this treatment plant. The sewer service area boundary was refined and detailed as part of the Greater Racine Area Utility Plan completed in 1992. That plan also recommends the abandonment of the Yorkville treatment plant and that service be provided by the Racine Wastewater Utility sewage treatment plant. This plan has not yet been formally adopted by the Regional Planning Commission as an amendment to the regional water quality management plan. Map 21 shows the area of the Town served by the District's sewage treatment plant in 1995, as well as the planned sewer service area.

Public Water Supply System

In 1995, the Village of Union Grove and the Grandview Business Park at Ives Grove were served by public water supply systems (see Map 21). The remainder of the planning area was not served by any public water supply system. Water for domestic and other uses was supplied by groundwater through the use of private onsite wells.

Engineered Stormwater Drainage System

In 1999, the Village of Union Grove was served by a engineered stormwater management system. Stormwater drainage in the Town of Yorkville was provided by roadside ditches and natural watercourses.

COMMUNITY FACILITIES AND SERVICES

Schools

In 1999, the Union Grove/Yorkville planning area was served by one public high school district, the Union Grove Union High School District. This District served the entire planning area and operates the Union Grove Union High School, a public high school located in the Village of Union Grove.

A number of elementary schools serve the Union Grove/Yorkville planning area. These include: Union Grove Grade School and Union Grove Middle School, both in the Village of Union Grove; and Yorkville School in the Town of Yorkville.

Library Services

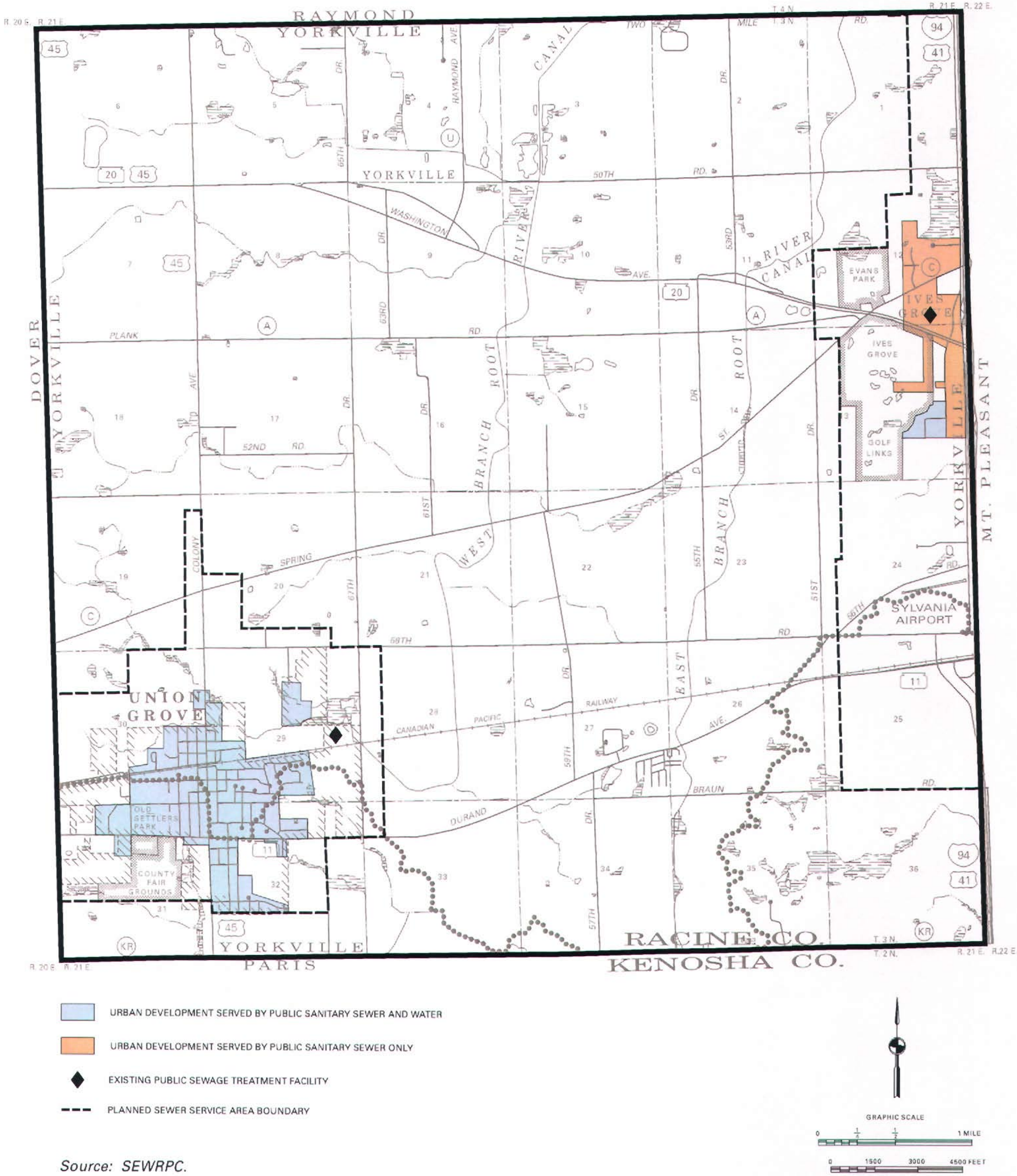
The Union Grove/Yorkville planning area is served by the Graham Public Library located in the Village of Union Grove. The library is owned and operated by the Village. The planning area is also served by the Lakeshore Library System. This system allows Union Grove and Yorkville residents to access books and other materials from all public libraries in Racine County.

Fire Protection, Emergency Medical Services, and Police Service

In 1999, fire protection and emergency medical services for the entire planning area was provided by the Union Grove-Yorkville Fire and Rescue Department, a joint public department created by the Village and Town. The fire station is located on USH 45 at 7th Street in the Village of Union Grove.

Map 21

EXISTING AND PLANNED SANITARY SEWER AND PUBLIC WATER SERVICE IN THE UNION GROVE/YORKVILLE PLANNING AREA: 1995



Source: SEWRPC.

In 1999, police protection within the planning area was provided by the Racine County Sheriff's Department.

Solid Waste Disposal

Village of Union Grove

In 1999, the Village provided curbside pickup service for solid waste to all Village residents. The Village separately contracted with a private firm for curbside pickup of materials for recycling.

Town of Yorkville

The Town maintains a solid waste and recycling transfer station located at the Town of Yorkville Collection Site at 19040 Spring Street. Town residents are responsible for transporting solid waste and recyclables to this site for recycling and disposal. In addition many Town residents contract separately with private firms for pickup of waste. There are no active landfills in the Town.

SUMMARY

This chapter has presented the findings of inventories of the existing land use pattern and of other aspects of the man-made environment pertinent to land use planning for the Union Grove/Yorkville area. A summary of the most important findings of inventories covered include:

1. In 1995, existing urban development within the Union Grove/Yorkville planning area consisted of two relatively densely developed areas in the Village of Union Grove and in the old settlement of Ives Grove. The planning area also encompassed a number of environmentally significant wetland and woodland areas and a number of relatively large blocks of farmland.

2. In 1995, urban land uses—consisting of residential, commercial, governmental and institutional, recreational, and transportation uses—encompassed about 3,330 acres, or about 14 percent of the planning area. Lands devoted to these urban uses increased by about 1,560 acres, or about 88 percent, between 1963 and 1995. Residential lands comprised the singularly largest urban land use category, encompassing about 1,340 acres, or about 40 percent of all urban land, and about 6 percent of the planning area.

3. By 1998, 795 lots had been created through residential subdivision plats in the Union Grove/ Yorkville planning area.

4. In 1995, nonurban land uses—consisting of agricultural lands, wetlands, woodlands, other open lands, and surface water—comprised about 19,850 acres, or about 86 percent of the planning area. Nonurban lands decreased by about 1,560 acres, or about 7 percent, between 1963 and 1995. Agricultural lands encompassed about 17,770 acres in the planning area, accounting for about 90 percent of all nonurban land, and about 77 percent of the planning area. Of the 17,770 acres of agricultural lands, about 14,830 acres, or about 83 percent, were identified as prime agricultural lands in the Racine County farmland preservation plan.

5. In 1999, the planning area was served by a 112-mile network of streets and highways. Of this total network, 49 miles, or about 43 percent, consisted of arterial streets and highways, all of which were under the jurisdiction of the County and State governments.

6. In 1995, public sanitary sewer service within the planning area was provided to the Village of Union Grove by the Village of Union Grove sewage treatment plant and to a portion of the Town of Yorkville by the Yorkville Sewer Utility District No. 1 sewage treatment plant. In addition the Village of Union Grove and a portion of the Ives Grove area were served by public water supply systems.

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Appendix H

Effluent Limit Request Correspondence

Building a Better World
for All of Us®

February 2, 2020

RE: Yorkville Sanitary District No. 1
Wastewater Facilities Plan
SEH No. 146260 14.00

Jason Knutson
Wasteater Section Chief
Wisconsin DNR, Bureau of Water Quality
PO Box 7921
Madison, WI 53707-7921

Subject: **Village of Yorkville Wastewater Treatment Plant (WWTP) Facilities Plan – Effluent Limits Request**

Dear Mr. Knutson:

SEH is currently preparing a Wastewater Treatment Facilities Plan for the Yorkville Sanitary District No. 1 of the Village of Yorkville addressing future wastewater treatment needs. In order to further develop the available treatment alternatives, SEH requests preliminary calculation of future effluent limits. The following paragraphs provide background information justifying the need for this request.

In October 2015 Yorkville received a notice of violation (NOV) from the Wisconsin Department of Natural Resources (WDNR) on exceedances for Chloride, Biological Oxygen Demand (BOD_5), Total Suspended Solids (TSS) and Ammonia in their effluent. The NOV Enforcement conference to discuss the exceedances was held in November 2017.

Yorkville is also anticipating growth within and surrounding the current sanitary sewer service area stemming from the new FoxConn development east of I-94.

Concurrent to this request, SEH is working with Southeastern Wisconsin Regional Planning Commission (SEWRPC) to develop a 1st Edition Sanitary Sewer Service Area (SSA) Plan for the Village of Yorkville. SEH will be submitting a request for concurrence with a 20-year projected service area, population, and wastewater flows. In order to expedite preparation of the SSA, Yorkville is requesting a planning area the matches the current Comprehensive Master Plan.

General Information:

- Yorkville Sanitary District No. 1
  Douglas Nelson
  Village President
  925 15th Avenue
  Union Grove, WI 53182

- Racine County
- WPDES Permit number: WI-0029831-08-1
- Current Limits: Attachment 1

NOV RELATED PROJECT NEED (SHORT TERM)

An initial NOV Claim was written on November 15, 2017 to the Town of Yorkville (prior to incorporating as a Village) and outlined exceedances for Chloride, BOD_5, TSS, and Nitrogen, Ammonia. Yorkville's Wastewater Discharge Monitoring Reports and Compliance Maintenance Annual Reports identified exceedances since January of 2013. On January 12, 2018, subsequent to the enforcement conference proceedings, Stafford Rosenbaum LLP outlined a timeframe which Yorkville use to bring the treatment plant back into compliance with regards to chlorides, ammonia, BOD and TSS. Yorkville created the following schedule as outlined in Attachment 3.

January 2018: Yorkville worked with SEH on a study to evaluate future treatment alternatives.
April 2018: Yorkville held a referendum on becoming a village.
June 2018: The new village board was elected.
October 2018: Yorkville submitted an NOV Compliance Report on October 1, 2018, which provided DNR with a recommended alternative for compliance with NOV related parameters and for future plant operations. The recommended alternative was construction of a new Sequencing Batch Reactor facility, including a new preliminary treatment building.

FUTURE WATER QUALITY BASED EFFLUENT LIMITS (WQBELS) FOR PHOSPHORUS (LONG TERM)

Prior to the NOV claim and subsequent NOV related compliance activities, the then Town of Yorkville had previously completed its required phosphorus compliance reports which included an Operational Evaluation Report (OER), Status Update Report, Preliminary Compliance Alterantives Plan, and Final Compliance Alternatives Plan. The Final Compliance Alternatives Plan (submitted on October 24, 2017) reviewed several alternatives for complying with the future WQBEL for phosphorus, including:

1.

FOXCONN RELATED GROWTH PROJECT NEED (LONG TERM)

Following the FOXCONN announcement in the summer of 2017, the Town of Yorkville became involved in several months of regional water and wastewater discussions to investigate receiving water from the City of Racine and discharging wastewater to the Racine WWTP. At the end of the regionalization investigation, Town officials determined this regional alternative was not cost effective to pursue.

Significant growth is still anticipated to occur within the Town immediately adjacent to I-94 and Foxconn. Accordingly, Yorkville held a referendum on incorporation in April 2018. Yorkville was successful in becoming a Village in April 2018 and a new Village Board and President were elected in June 2018.

PRELIMINARY ALTERNATIVES

With the understanding of WDNR's previous approval of the MDV for phosphorus, concurrence with the recommended alternative in the NOV Report of constructing a new SBR facility, and recommendation to revisit a regional alternative, as well as the facility planning drivers above, SEH is developing the following base alternatives:

- Expand the current WWTP utilizing a new SBR system and maintain use of the existing outfall
- Update/Re-evaluate Regionalization with Racine
- Update/Re-evaluate Regionalization with Union Grove

The goals of the alternatives are to equip the community with the proper means to handle future flow and loading increases both in the short and long term, while also coming into compliance with the current WDPES Permit, as a response to NOV's. For the expansion of the existing WWTP, flexibility will be included in the physical layout of the facility and the hydraulic profile to allow for future construction and installation of tertiary filtration, following conclusion of the MDV for phosphorus.

Alternative 1 assumes expanding the current WWTP to address the NOV's and treat future 20-year projected flows and loadings based on the comprehensive planning and sewer service area development currently underway. The projected increases in flows are shown in Table 1. This alternative would maintain the existing outfall on Ives Grove Branch of Hoods Creek.

Table 1: 20-Year Flow Projections

Flow	**Units**	**Existing**	**5-Year**	**10-Year**	**15-Year**	**20-Year**	**Peaking Factors**
Year		**2020**	**2025**	**2030**	**2035**	**2040**	
Minimum Month (at startup)	MGD	0.059	0.098	0.137	0.176	0.215	0.8
Average Annual	MGD	0.071	0.118	0.165	0.213	0.260	N/A
Maximum Month	MGD	0.097	0.162	0.227	0.291	0.356	1.4
Maximum Week	MGD	0.114	0.189	0.265	0.340	0.416	1.6
Maximum Day	MGD	0.199	0.331	0.463	0.596	0.728	2.8
Peak Hour[1]	MGD	0.296	0.493	0.690	0.887	1.084	4.2
Peak Instantaneous	N/a						

Notes:
1) Estimated based on 10 States Standards equation based on estimated population. Peak hour data not currently available. This provides a very conservative estimate, as I&I is not significant within the existing SSA.

Alternative 2 considers revisiting the regional alternative with Racine that was previously evaluated during the phosphorus Final Compliance Alternatives Plan, and updates this analysis using information provided by the Village of Mount Pleasant and the City of Racine during the original FOXCONN discussions that occurred previously.

Alternative 3 considers revisiting the regional alternative with Union Grove that was previously evaluated during the phosphorus Final Compliance Alternatives Plan, and updates this analysis based on updated conditions.

SEH requests WDNR provide the following preliminary effluent limit calculations:

- Upgrade the existing WWTP for the 20-Year Projected Flows and discharge through the existing outfall

Please feel free to contact me at 920.287.0829 or dschaefer@sehinc.com with any questions, comments, or clarification requests.

Given the extremely tight timeline contained in the Village of Yorkville's new WPDES permit with respect to NOV compliance activities, the Village is moving forward with early design activities such as field survey, geotechnical investigation, and conceptual layout of the previously approved SBR system. It is our understanding that DNR cannot provided flexibility to the final compliance date of July 1, 2021 for compliance with NOV parameters, so the new SBR system would need to be complete by this date, meaning the project would need to be bid and awarded by August or September 2020 to allow for adequate construction duration and system startup.

Sincerely,

SHORT ELLIOTT HENDRICKSON INC.

Dan Schaefer, PE
Project Manager

Attachment 1: Approved SSA Map
Attachment 2: Current Limits, NOV Compliance & MDV Text from WPDES Permit (Table 2.2.1)
Attachment 3: NOV Related Correspondence (November 15, 2017 through January 5, 2018)
Attachment 4: WDNR Concurrence Correspondence with NOV Report

c: Bryan Hartsook, WDNR
Jake Wedesky, WDNR
Andrew Dutcher, WDNR
Gary Hanson, Yorkville WWTP
Randy Sanford, SEH
Art Harrington, Godfrey & Kahn

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2 Surface Water Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
001	EFFLUENT: 24-hr flow proportional composite samples shall be collected after the clarifier prior to the old chlorine contact tank. Grab samples shall be collected after final effluent weir.

2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point (Outfall) 001 - EFFLUENT

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD_5, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD_5, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	5/Week	Grab	
Nitrogen, Ammonia Variable Limit		mg/L	2/Week	Calculated	Report the calculated variable Ammonia limit on the DMR year round. See Maximum Ammonia limits table in section 2.2.1.2.
Nitrogen, Ammonia (NH_3-N) Total	Daily Max - Variable	mg/L	2/Week	24-Hr Flow Prop Comp	Report Ammonia effluent value on the DMR year round.
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	29 mg/L	2/Week	24-Hr Flow Prop Comp	Effective May - October
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	5.1 mg/L	2/Week	24-Hr Flow Prop Comp	Effective November - April
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	12.4 mg/L	2/Week	24-Hr Flow Prop Comp	Effective May - October
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	2.2 mg/L	2/Week	24-Hr Flow Prop Comp	Effective November - April

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total	Monthly Avg	1.0 mg/L	2/Week	24-Hr Flow Prop Comp	This is an interim MDV limit effective through June 30, 2021. See the MDV/Phosphorus and schedules section of the permit.
Phosphorus, Total	Monthly Avg	0.8 mg/L	2/Week	24-Hr Flow Prop Comp	This is an interim MDV limit effective on July 1, 2021. See the MDV/Phosphorus and schedules section of the permit.
Phosphorus, Total		lbs/month	Monthly	Calculated	Report the total monthly phosphorus discharged in lbs/month on the last day of the month on the DMR. See section 5.4.2 of the permit for 'Appropriate Formulas' to calculate the Total Monthly Discharge in lbs/month.
Phosphorus, Total		lbs/yr	Annual	Calculated	Report the sum of the total monthly discharge load for the calendar year on the Annual Report form.
Chloride	Daily Max	1,400 mg/L	4/Month	24-Hr Flow Prop Comp	This is an interim limit. Sampling shall be conducted on four consecutive days each month. See Chloride Variance section below and the Schedules section for applicable chloride target value.
Chloride	Weekly Avg	450 mg/L	4/Month	24-Hr Flow Prop Comp	This is an interim limit. Effective May - November. Sampling shall be conducted on four consecutive days each month. See Chloride Variance section below and the Schedules section for applicable chloride target value.

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Chloride	Weekly Avg	710 mg/L	4/Month	24-Hr Flow Prop Comp	This is an interim limit. Effective December - April. Sampling shall be conducted on four consecutive days each month. See Chloride Variance section below and the Schedules section for applicable chloride target value.
Chloride		lbs/day	4/Month	Calculated	Chloride Mass = daily concentration (mg/L) x daily flow (MGD) x 8.34
Zinc, Total Recoverable		µg/L	Monthly	24-Hr Flow Prop Comp	Monitoring for zinc required only in calendar year 2023.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See WET section below.
Chronic WET		TU_c	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See WET section below.

2.2.1.1 Annual Average Design Flow

The annual average design flow of the permittee's wastewater treatment facility is 0.150 MGD.

2.2.1.2 Daily Maximum Ammonia Limits

The daily maximum limits for ammonia correspond to the daily pH value, in accordance with the following table:

Effluent pH (s.u.)	NH_3-N Limit (mg/L)	Effluent pH (s.u.)	NH_3-N Limit (mg/L)	Effluent pH (s.u.)	NH_3-N Limit (mg/L)
6.0 < pH ≤ 6.1	55	7.0 < pH ≤ 7.1	36	8.0 < pH ≤ 8.1	8.4
6.1 < pH ≤ 6.2	54	7.1 < pH ≤ 7.2	33	8.1 < pH ≤ 8.2	6.9
6.2 < pH ≤ 6.3	53	7.2 < pH ≤ 7.3	30	8.2 < pH ≤ 8.3	5.7
6.3 < pH ≤ 6.4	52	7.3 < pH ≤ 7.4	26	8.3 < pH ≤ 8.4	4.7
6.4 < pH ≤ 6.5	51	7.4 < pH ≤ 7.5	23	8.4 < pH ≤ 8.5	3.9
6.5 < pH ≤ 6.6	49	7.5 < pH ≤ 7.6	20	8.5 < pH ≤ 8.6	3.2
6.6 < pH ≤ 6.7	47	7.6 < pH ≤ 7.7	17	8.6 < pH ≤ 8.7	2.7
6.7 < pH ≤ 6.8	45	7.7 < pH ≤ 7.8	14	8.7 < pH ≤ 8.8	2.2
6.8 < pH ≤ 6.9	42	7.8 < pH ≤ 7.9	12	8.8 < pH ≤ 8.9	1.8
6.9 < pH ≤ 7.0	39	7.9 < pH ≤ 8.0	10	8.9 < pH ≤ 9.0	1.6

2.2.1.3 MDV (Multi-Discharger Variance) Requirements

Optimization: The permittee shall continue to optimize performance to control phosphorus discharges in accordance with s. 283.16(6), Wis. Stats. See the Schedules section for optimization requirements.

Watershed Provisions: The permittee is required to implement watershed measures to reduce the amount of phosphorus entering the receiving water. The permittee has selected the following approved watershed measure.

Payment to County for Phosphorus Reduction: The permittee shall make payments for phosphorus reduction to the county or counties approved by the Department per s. 283.16(8), Wis. Stats. The permittee shall make a total payment by March 1 of each year in the amount equal to the per pound amount of $53.01 times the number of pounds by which the effluent phosphorus discharged during the previous year exceeded the permittee's target value or $640,000, whichever is less. The target value is 0.2 mg/L per s. 283.16(1)(h), Wis. Stats., and is applicable during the months that the MDV is in effect. The MDV is in effect year-round Refer to the Schedules section for the scheduled annual requirements.

Annual Payment Calculation: The annual payment is equal to the phosphorus load that exceeds the target value multiplied by **$53.01** per pound. Use the steps shown below to calculate the annual payment. In addition, the Department shall send a statement to the permittee specifying total payment due to the participating counties each year in accordance with the Schedules section.

Annual Payment = [Annual Phosphorus Load – Annual Target Load] × Price Per Pound
Calculation Steps:

1. Calculate pounds of phosphorus discharged for each month that the MDV is in effect:

   Monthly Phosphorus Load (lbs/month) = Total Monthly Flow (MG) × Monthly Avg. TP effluent conc. (mg/L) × 8.34

2. Sum the pounds per month for each month that the MDV is in effect to calculate the Annual Phosphorus Load:

   Annual Phosphorus Load (lbs/year) = ∑ [Monthly Phosphorus Load (lbs/month)]

3. Calculate the Target Load (lbs/month) for each month that the MDV is in effect:

   Target Value = 0.2 mg/L:
   Monthly Target Load (lbs/month) = Total Monthly Flow (MG) × 0.2 mg/L × 8.34

4. Sum the pounds per month for the months that the MDV is in effect to calculate the Annual Target Load:

   Annual Target Load (lbs/year) = ∑ [Monthly Target Load (lbs/month)]

5. Calculate the Annual Payment:

   Annual Payment = [Annual Phosphorus Load – Annual Target Load] × Price Per Pound

2.2.1.4 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Ives Grove Ditch

A synthetic (standard) laboratory control water may be used due to potential lack of baseflow in the receiving water

Instream Waste Concentration (IWC): 100%

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.
- **Chronic:** 100, 75, 50, 25, 12.5% and any additional selected by the permittee.

WET Testing Frequency:

Acute tests shall be conducted every year, in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Acute:** July – September 2019; October – December 2020; January – March 2021; April 2022 – June 2022; July 2023 – September 2023

Acute WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in July – September 2023.

Chronic tests shall be conducted every year, in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Chronic:** July – September 2019; October – December 2020; January – March 2021; April 2022 – June 2022; July 2023 – September 2023

Chronic WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in July – September 2023.

Testing: WET testing shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during WET tests.

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The Discharge Monitoring Report (DMR) form shall be submitted electronically by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: $TU_a = 100 \div LC_{50}$. A chronic toxicity test shall be considered positive if the Toxic Unit - Chronic (TU_c) is greater than 1.0 for either species. The TU_c shall be calculated as follows: $TU_c = 100 \div IC_{25}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The 90 day reporting period shall begin the day after the test which showed a positive result. The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

2.2.1.5 Chloride Variance – Implement Source Reduction Measures

This permit contains a variance to the water quality-based effluent limit (WQBEL) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code. As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitation specified in the table above, (b) implement the chloride source reduction measures specified below, (c) follow the approved Source Reduction Plan and (d) perform the actions listed in the schedule. (See the Schedules section herein.):

1. Educate softener owners on the impact of chloride on water quality; provide information about increasing softener efficiency and reducing the use of softened water.
2. Develop an ordinance requiring the inspection of water softener equipment at time of sale of or transfer of real estate and construction of a new home building.
3. Offer to Utility users a purchase incentive to upgrade existing water softeners.

4. For existing softeners, the Utility will conduct a residential softener tune-up program, which involves a qualified servicing to ensure proper control settings and adjustments.
5. Develop and refine a mass balance for chloride sample data.
6. Analyze industrial and commercial contributors to prevent increases in the amount of chloride discharged and seek reductions from those sources.
7. Mandate through ordinance that chloride loading from industrial sources does not exceed the effluent limit of the WWTF.
8. Continue complying with CMOM practices and specifically regarding manhole inspection, sewer cleaning, and repairs. All manholes will be inspected once every 5 years.
9. Continue working with the Racine County Highway Department (RCHD) specifically regarding conformance with local chloride limits.
    a. Utility will conduct meeting with the RCHD as to the status of improvement to the Highway Dept. Campus inspections. Establish a schedule for the implementation of source reduction measures to be implemented.
    b. Implement source reduction measures identified. After source reduction measures are implemented, collect and analyze samples and provide a report of chloride loadings. Track compliance with the ordinance and implementation of the source reduction measures. Provide a summary report and data trends.

3 Land Application Requirements

3.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
003	Aerobically digested sludge collected once annually prior to hauling and test results reported on Form 3400-49 - Waste Characteristics Report. Form 3400-52 - Other Methods of Disposal or Distribution Report is required following each year sludge is hauled.

3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 003 - Hauled Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Annual**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Annual**

3.2.1.1 Applicability of Limits and Sludge Land Application

As long as sludge is hauled to another permitted facility as the sole disposal method the metals limits in the table above do not apply and monitoring may remain at Annual. If the permittee plans to land apply sludge during the permit term the permittee must notify the Department at least 180 days prior to land application and the permit shall be modified to include the appropriate land application requirements.

4 Schedules

4.1 Facility Modifications - Ammonia Removal & Phosphorus MDV Interim Limit 0.8 mg/L

This compliance schedule requires the permittee to complete facility modifications necessary for improved ammonia nitrogen removal and achieving compliance with the Multi-Discharger Variance (MDV) interim effluent limit of 0.8 mg/L in accordance with s. 283.16(6), Wis. Stats., by the due date.

Required Action	Due Date
Plans and Specifications: Submit plans and specifications for treatment facility modifications as needed to improve ammonia nitrogen removal and to comply with the interim MDV phosphorus limit by 07/01/2021.	12/31/2019
Initiate Actions: Initiate actions identified in the action plan or facility plan amendment.	06/30/2020
Progress Report: Submit a progress report summarizing actions taken to date.	12/31/2020
Complete Actions: Complete actions necessary to improve ammonia nitrogen removal and to achieve compliance with the interim MDV phosphorus limit. The Interim MDV phosphorus limit of 0.8 mg/L expressed as a monthly average goes into effect 07/01/2021.	06/30/2021
Progress Report #1: Submit a progress report on effluent discharges of total ammonia nitrogen with conclusions regarding compliance and continued optimization of phosphorus removal by the Due Date.	06/30/2022
Progress Report #2: Submit a progress report on effluent discharges of total ammonia nitrogen with conclusions regarding compliance and continued optimization of phosphorus removal by the Due Date.	06/30/2023

4.2 Phosphorus Payment per Pound to County

The permittee is required to make annual payments for phosphorus reductions to the participating county or counties in accordance with s. 283.16(8), Wis. Stats, and the following schedule. The price per pound will be set at the time of permit reissuance and will apply for the duration of the permit.

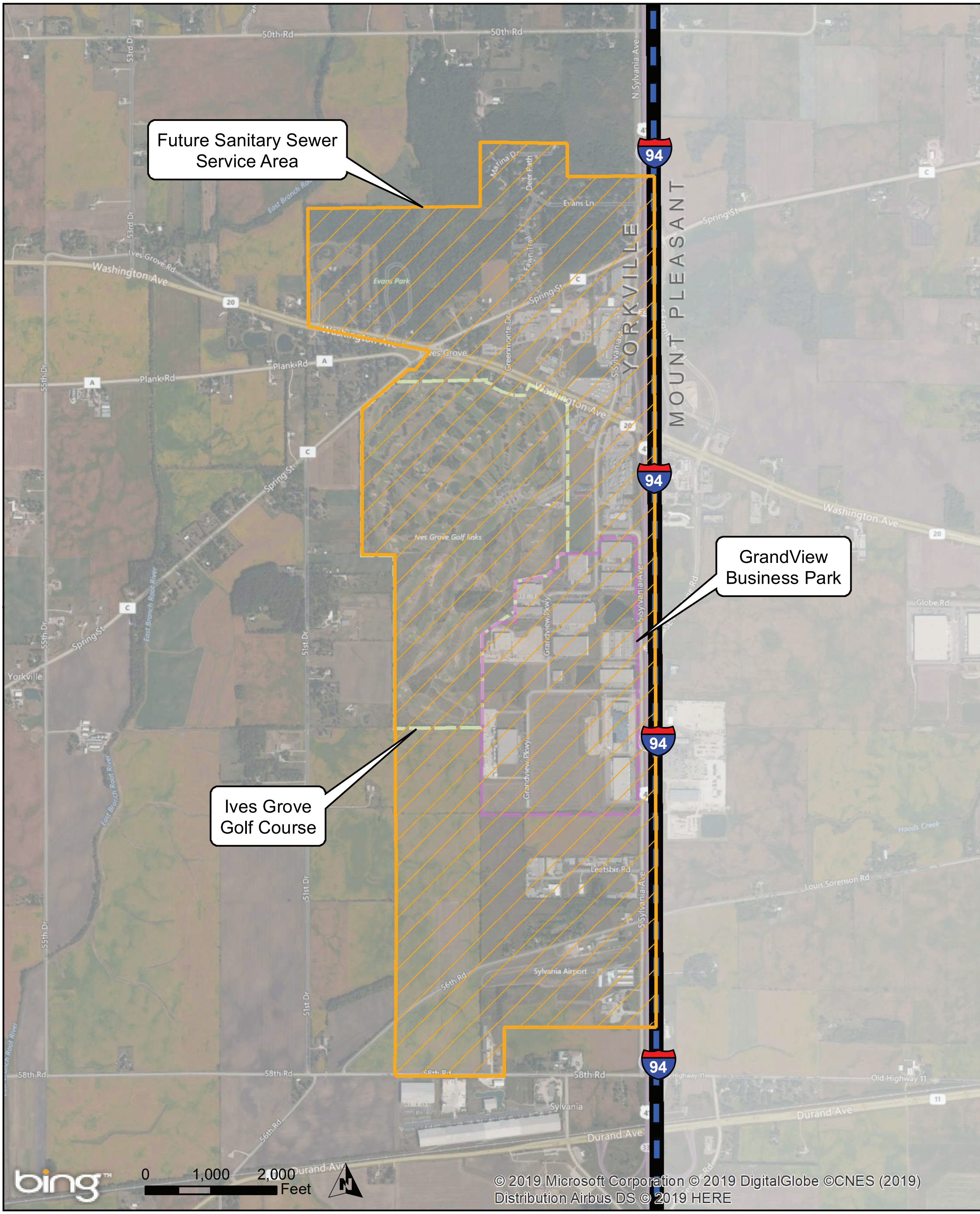
Required Action	Due Date
Annual Verification of Phosphorus Payment to County: The permittee shall make a total payment to the participating county or counties approved by the Department by March 1 of each calendar year. The amount due is equal to the following: [(lbs of phosphorus discharged minus the permittee's target value) times ($53.01 per pound) or $640,000, whichever is less. See the payment calculation steps in the Surface Water section. The permittee shall submit Form 3200-151 to the Department by March 1 of each calendar year indicating total amount remitted to the participating counties to verify that the correct payment was made. The first payment verification form is due by the specified Due Date. Note: The applicable Target Value is 0.2 mg/L as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is $50.00 adjusted for CPI.	12/31/2019
Annual Verification of Payment #2: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	12/31/2020
Annual Verification of Payment #3: Submit Form 3200-151 to the Department indicating total	12/31/2021

amount remitted to the participating counties.	
Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	12/31/2022
Annual Verification of Payment #5: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	12/31/2023
Annual Verification of Payment After Permit Expiration: In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to submit Form 3200-151 to the Department indicating total amount remitted to the participating counties by March 1 each year.	
Continued Coverage: If the permittee intends to seek a renewed variance, an application for the MDV (Multi Discharger Variance) shall be submitted as part of the application for permit reissuance in accordance with s. 283.16(4)(b), Wis. Stats.	

4.3 Chloride Target Value

As a condition of the variance to the water quality based effluent limitation(s) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code, the permittee shall perform the following actions.

Required Action	Due Date
Annual Chloride Progress Report: Submit an annual chloride progress report. The annual chloride progress report shall: Indicate which chloride source reduction measures or activities in the approved Source Reduction Plan have been implemented; Include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data; and Include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride such as loads from industries or road salt intrusion into the collection system. Note that the interim limitation of 710 mg/L weekly average November through April, 450 mg/L weekly average May thorugh October, and 1400 mg/L daily maximum year-round remains enforceable until new enforceable limits are established in the next permit issuance. The first annual chloride progress report is to be submitted by the Date Due.	06/30/2020
Annual Chloride Progress Report #2: Submit the chloride progress report as defined above.	06/30/2021
Annual Chloride Progress Report #3: Submit the chloride progress report as defined above.	06/30/2022
Annual Chloride Progress Report #4: Submit the chloride progress report as defined above.	06/30/2023
Final Chloride Report: Submit a final report documenting the success in meeting the chloride target values of 400 mg/L, May to Nov and 640 mg/L December to April as well as the anticipated future reduction in chloride sources and chloride effluent concentrations. The report shall summarize chloride source reduction measures that have been implemented during the current permit term and state which, if any, source reduction measures from the approved Source Reduction Plan were not pursued and why. The report shall include an analysis of trends in weekly, monthly and annual average chloride concentrations and total mass discharge of chloride based on chloride sampling and flow data covering the current permit term. The report shall also include an analysis of how influent and effluent chloride varies with time and with significant loadings of chloride such as loads from industries or road salt intrusion into the collection system. Additionally the report shall include proposed target values and source reduction measures for	12/31/2023



Path: P:\UZ\Y\YORKV\149602\8-planning\GIS\Utilities\Corridor Plan Utilities.mxd

316 North Milwaukee Street
Suite 302, Landmark Building
Milwaukee, WI 53202-5888
www.sehinc.com

Project Number: YORKV 149602
Print Date: 10/18/2019
Map by: BG

Future Sanitary Sewer Service Area

Village of Yorkville, WI

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
2300 N. Dr. Martin Luther King, Jr. Dr.
Milwaukee, WI 53212-3128

Scott Walker, Governor
Daniel L. Meyer, Secretary
Telephone 608-266-2621
FAX 608-267-3579
TTY Access via relay - 711

WISCONSIN
DEPT. OF NATURAL RESOURCES

October 24, 2017

Racine County
Personal Service Requested

Peter Hansen, Chairman
Town of Yorkville
925 15th Avenue
Union Grove, WI 53182

Subject: NOTICE OF VIOLATION/NOTICE OF CLAIM/ENFORCEMENT CONFERENCE – November 15, 2017

Dear Chairman Hansen:

The Department of Natural Resources (department) has reason to believe that the Town of Yorkville (Town) is in violation of its Wisconsin Pollution Discharge Elimination System Permit #WI-0029831-08-1, effective April 1, 2013 (WPDES Permit), located at The Yorkville Sewer Utility District No. 1, 14100 Washington Avenue, Sturtevant, Racine County, Wisconsin (POTW). The Department alleges the following violations:

1. **WPDES Permit Condition 2.2.1 – Sampling Point (Outfall) 001 – Monitoring Requirements and Effluent Limitations: The permittee shall comply with the following monitoring requirements and limitations for Chloride, Biological Oxygen Demand (BOD5), Total Suspended Solids (TSS) and Nitrogen, Ammonia:**

The department's reviews of the Town's Wastewater Discharge Monitoring Reports and Compliance Maintenance Annual Reports since January of 2013 identified exceedances for Chloride, BOD5, TSS and Nitrogen, Ammonia. See Exhibit 01 for tables identifying specific exceedances.

The department issued Notices of Noncompliance on May 7, 2015 and June 30, 2016 requesting the Town address the exceedances. Based on sampling results since June 30, 2016, the Town continues to exceed limitations within their WPDES Permit.

2. **WPDES Permit Condition 5.2.1 – Noncompliance Notification: The permittee shall report the following types of noncompliance by telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:**

   - **any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the Permit, either for effluent or sludge.**

Since 2013 the Town's Monthly Discharge Monitoring Reports (DMR) identified exceedances of pollutants listed in the Permit, see Appendix A for details. The department has no record of the Town conducting a phone call to the department making a notification within 24 hours of becoming aware of the exceedances. The department has been first learning of the exceedances upon submittal of the Town's DMRs.

We have scheduled the following Enforcement Conference to discuss this matter in more detail:

Conference Date:	**November 15, 2017**
Conference Time:	**10:00 a.m.**
Location:	**Department of Natural Resources Southeast Region Headquarters 2300 N. Dr. Martin Luther King, Jr. Drive Milwaukee, WI 53212**

We request you attend the Enforcement Conference as it is an important opportunity to discuss the circumstances surrounding the alleged violations and to learn your perspective on this matter. Please note that in an effort to encourage a candid and productive conversation, attendance is limited to you, your legal counsel and others with the technical expertise necessary to understand, evaluate and correct the violation. A fact sheet describing the Enforcement Conference is enclosed.

Please bring with you to the Enforcement Conference the Town's plans to achieve compliance with their WPDES Permit and discontinue unpermitted discharges from their POTW.

The department's enforcement decision will be based upon available information if you do not attend.

Please be advised the department is authorized to seek injunctive or other appropriate relief for violations of pollution discharge elimination laws, including forfeitures of not more than $10,000 per day of violation pursuant to s. 283.91(2), Wis. Stats. Each day of violation is considered a separate offense.

This Notice of Violation fulfills the requirements of s. 893.80(1), Wis. Stats., which requires that a written notice of the circumstances of a claim be served on the governmental subdivision or agency within 120 days after the happening of the event which gave rise to the claim.

If you have questions or need to reschedule please contact me at (414) 263-8663.

Sincerely,

Benton C. Stelzel
Environmental Enforcement Specialist

Enclosure: Exhibit A, Map, Enforcement Conference Fact Sheet

c: G. Thielen – DNR/SER Milwaukee

Exhibit A

Chloride Exceedances			
Date	*Result Amount*	*Description*	*Limit Amount*
01/28/2013	712 mg/L	Weekly Average Limit	710 mg/L
05/11/2013	465.3 mg/L		450 mg/L
09/15/2013	694.7 mg/L		450 mg/L
10/23/2013	454.5 mg/L		450 mg/L
11/22/2013	454.5 mg/L		450 mg/L
01/18/2014	1222.5 mg/L		710 mg/L
02/15/2014	1011.3 mg/L		710 mg/L
02/23/2014	1315 mg/L		710 mg/L
03/01/2014	995 mg/L		710 mg/L
04/12/2014	776.7 mg/L		710 mg/L
04/15/2014	772 mg/L		710 mg/L
05/03/2014	705.5 mg/L		450 mg/L
06/01/2014	570 mg/L		450 mg/L
07/04/2014	561.8 mg/L		450 mg/L
09/07/2014	473 mg/L		450 mg/L
10/18/2014	476.8 mg/L		450 mg/L
11/08/2014	588.8 mg/L		450 mg/L
12/01/2014	712 mg/L		710 mg/L
01/10/2015	1437.5 mg/L		710 mg/L
03/08/2015	872.8 mg/L		710 mg/L
04/04/2015	885.8 mg/L		710 mg/L
05/16/2015	695.8 mg/L		450 mg/L
06/06/2015	550 mg/L		450 mg/L
06/08/2015	590 mg/L		450 mg/L
07/18/2015	560 mg/L		450 mg/L
08/08/2015	520.8 mg/L		450 mg/L
09/21/2015	534 mg/L		450 mg/L
09/22/2015	566 mg/L		450 mg/L
10/10/2015	555.3 mg/L		450 mg/L
11/01/2015	534.8 mg/L		450 mg/L
01/24/2016	809 mg/L		710 mg/L
02/13/2016	774 mg/L		710 mg/L
02/15/2016	799 mg/L		710 mg/L

03/14/2016	730 mg/L		710 mg/L
04/16/2016	734.3 mg/L		710 mg/L
05/07/2016	673 mg/L		450 mg/L
05/08/2016	598.3 mg/L		450 mg/L
07/09/2016	552.8 mg/L		450 mg/L
08/20/2016	516.5 mg/L		450 mg/L
08/22/2016	540.5 mg/L		450 mg/L
09/06/2016	519.5 mg/L		450 mg/L
09/08/2016	500.5 mg/L		450 mg/L
10/01/2016	501.3 mg/L		450 mg/L
11/12/2016	533.3 mg/L		450 mg/L
11/15/2016	543 mg/L		450 mg/L
12/26/2016	791.7 mg/L		710 mg/L
01/14/2017	800 mg/L		710 mg/L
01/15/2017	785.7 mg/L		710 mg/L
05/13/2017	541.5 mg/L		450 mg/L
05/15/2017	533.5 mg/L		450 mg/L
06/11/2017	619 mg/L		450 mg/L
08/05/2017	537 mg/L		450 mg/L
08/08/2017	558 mg/L		450 mg/L
09/05/2017	456.3 mg/L		450 mg/L
09/08/2017	512 mg/L		450 mg/L

Nitrogen, Ammonia Exceedances

Date	*Result Amount*	*Description*	*Limit Amount*
02/17/2014	11.8 mg/L		11.4 mg/L
01/10/2015	17.5 mg/L		11.4 mg/L
01/11/2015	16.3 mg/L		11.4 mg/L
02/16/2015	12.6 mg/L		11.4 mg/L
02/17/2015	15.4 mg/L	Daily Maximum Limit	11.4 mg/L
02/23/2015	27.1 mg/L		11.4 mg/L
02/24/2015	25.7 mg/L		11.4 mg/L
03/02/2015	26.6 mg/L		11.4 mg/L
03/03/2015	24.4 mg/L		11.4 mg/L
03/10/2015	19 mg/L		11.4 mg/L
01/03/2016	12.9 mg/L	Monthly Avg.	12.4 mg/L
01/17/2016	12.7 mg/L		11.4 mg/L
01/18/2016	15.6 mg/L		11.4 mg/L
01/25/2016	20.9 mg/L	Daily Maximum Limit	11.4 mg/L
01/27/2016	19.5 mg/L		11.4 mg/L
02/03/2016	12.9 mg/L		11.4 mg/L
12/15/2016	12.6 mg/L		11.4 mg/L

12/19/2016	14.5 mg/L		11.4 mg/L
12/20/2016	16.8 mg/L		11.4 mg/L
12/21/2016	18.1 mg/L		11.4 mg/L
01/09/2017	23 mg/L		11.4 mg/L
01/10/2017	16.9 mg/L		11.4 mg/L

BOD5 Exceedances

Date	*Result Amount*	*Description*	*Limit Amount*
01/03/2016	67.1 mg/L	Monthly Avg.	20 mg/L
01/03/2016	51 mg/L	Weekly Average Limit	30 mg/L
01/11/2016	39 mg/L		30 mg/L
01/17/2016	63 mg/L		30 mg/L
01/25/2016	115.3 mg/L		30 mg/L
04/04/2016	22.1 mg/L	Monthly Avg.	20 mg/L
05/01/2016	31.5 mg/L	Weekly Average Limit	30 mg/L
07/24/2017	*93.7 mg/L		30 mg/L

TSS Exceedances

Date	*Result Amount*	*Description*	*Limit Amount*
12/01/2015	25.3 mg/L	Monthly Avg.	20 mg/L
12/08/2015	33.9 mg/L	Weekly Avg.	30 mg/L
01/03/2016	41.4 mg/L	Monthly Avg.	20 mg/L
01/03/2016	48.2 mg/L	Weekly Average Limit	30 mg/L
01/10/2016	56.5 mg/L		30 mg/L
01/17/2016	39.7 mg/L		30 mg/L
05/01/2016	30.1 mg/L		30 mg/L

Environmental Enforcement Conference

An Enforcement Conference (EC) is a meeting between Department of Natural Resources staff and representatives of a person or business that the Department believes has violated an environmental law. The Department issues a Notice of Violation (NOV) when it has reason to believe that a violation of a permit condition, administrative rule or statutory requirement has occurred. The NOV either offers or schedules an EC.

Why Should I Attend?
The EC is an important opportunity to discuss the Department's basis for the alleged violation(s) and learn more about what happened, why it may have happened, and any factors you believe the Department should consider, such as steps that have been or will be taken to stop the violation, correct any effects of the violation, and prevent violations from occurring in the future. It is also your opportunity to explain why you might disagree with the factual and legal conclusions underlying the NOV.

Historic data shows that most violations are resolved at the EC level, without the need for court ordered compliance and/or penalties. In situations where the significance of the violation warrants further enforcement action, your cooperative efforts to resolve the violation and prevent future violations will help minimize your legal and financial liability.

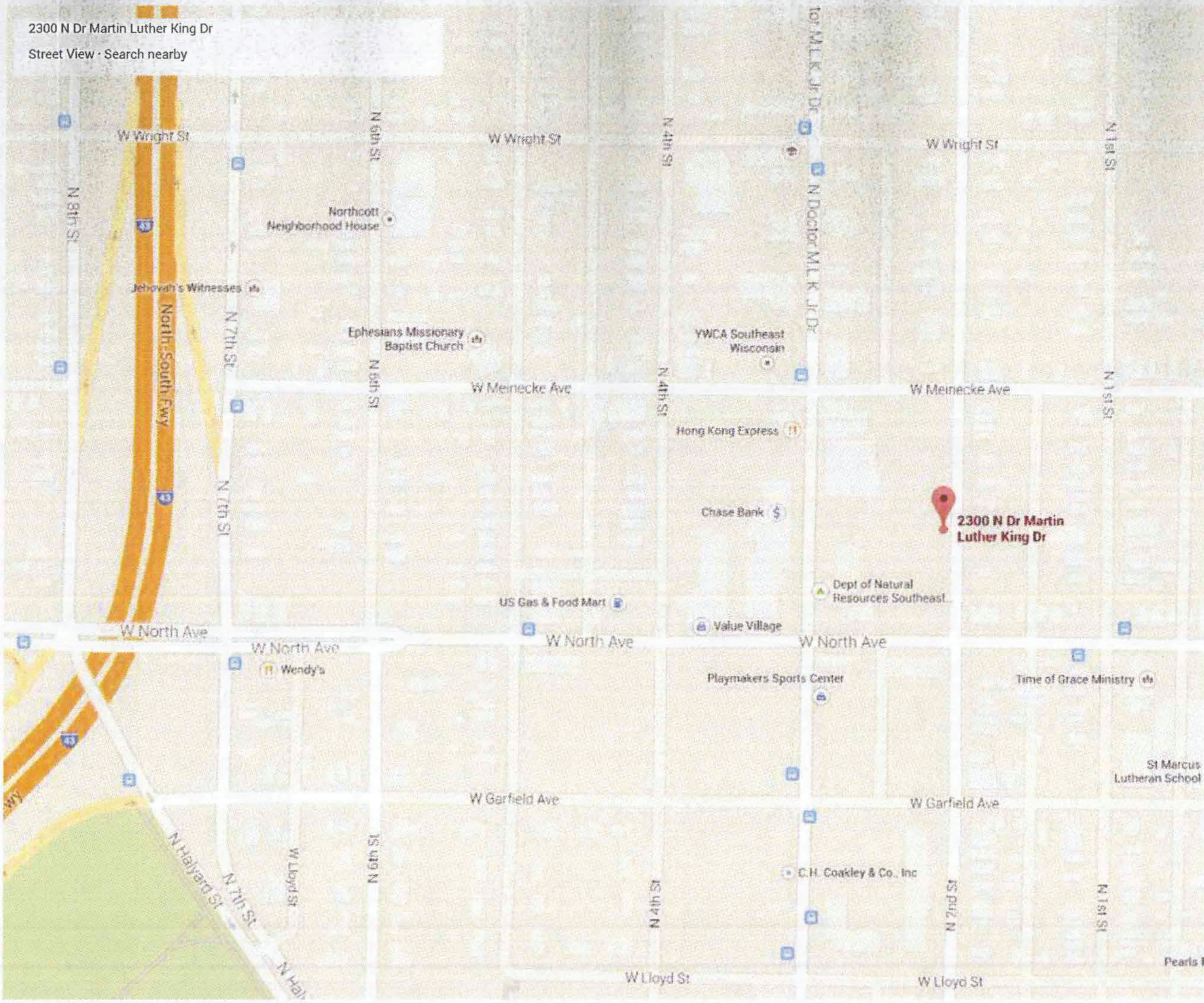
Who Should Attend the EC?
Department staff involved in the EC typically consists of an Environmental Enforcement Specialist and regulatory staff that are familiar with the issues identified in the NOV.

While not required, you may seek representation by legal counsel or the assistance of an environmental consultant to prepare for and/or attend the EC. The EC is most productive when all involved are well-prepared to discuss the allegations and any corrective actions that may be necessary.

To ensure a productive candid discussion, participation in the EC is limited to the person or business involved and others with the legal or technical expertise necessary to understand, evaluate, mitigate and correct the violation. The EC is not an open meeting under state law and the Department will limit participation to those directly involved in the resolution of the matter.

What Happens if I don't Attend the EC?
If a party is unable to attend the EC, they should immediately contact the Environmental Enforcement Specialist at the phone number in the NOV to reschedule. When a party refuses to attend the EC and provides no further information to the Department, the Department's enforcement decision will be based upon available information.

What Happens Following the EC?
The EC is part of the Department's stepped enforcement process. At the EC, Department staff will explain the process and options available to address the alleged violation. Generally, the options range from closing the matter with no further action to referral to the Wisconsin Department of Justice (DOJ) or to U.S. EPA, for further enforcement action. In limited circumstances, the Department can issue citations, which are handled in local court similar to traffic offenses. If a case is referred to DOJ, the DOJ may initiate an action in court on behalf of the State. The State typically asks the Court to impose financial penalties and order completion of any necessary corrective actions. In most of the Department's cases, a cooperative return to compliance with any necessary restoration results in close out of the case. At close out, the Department will send a letter advising of no further enforcement action.



Map data ©2014 Google 200 ft

State of Wisconsin
Department of Natural Resources

CERTIFICATE OF SERVICE OF NOTICE OF CLAIM

(Pursuant to Section 893.80, Wis. Stats.)

I hereby certify that on (Date) 10/24/17 at (Time) 9:10 am/pm,

I did serve a Notice of Claim on:

Peter Hansen, Chairman
Town of Yorkville
925 15th Avenue
Union Grove, WI 53182

HOW THE NOTICE WAS SERVED

- [ ] I handed a copy to the above named person.
- [ ] I exhibited and read it to the person to whom it is directed.
- [x] I left a copy thereof at the office or home of the above named person with:

Michael McKinney, Clerk-Treasurer
(Name and Title)

- [x] The above named person was known to me or identified themselves to be the above named person.
- [ ] The person served was asked to sign this document as acknowledgment of receipt of the original document and refused.

Signature of Person Served:

(Name) Michael McKinney (Title) Clerk-Treasurer

Signature of Server:

(Name) Geisa thielen (Title) wastewater engineer
Geisa Thielen   Wastewater Engineer

Case Name: Yorkville Sewer Utility District No. 1

StaffordRosenbaum LLP
Attorneys

Member of Geneva Group International
The Leading Global Alliance of Independent Professional Firms

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January 12, 2018

VIA EMAIL

Benton C. Stelzel
Environmental Enforcement Specialist
Wisconsin Department of Natural Resources
141 NW Barstow, Room 180
Waukesha, WI 53188

RE: Follow Up to Yorkville Sewer Utility District No. 1 December 12, 2017 NOV/Enforcement Conference

Dear Mr. Stelzel:

I am writing on behalf of our clients, the Yorkville Sewer Utility Distrcit No. 1, as a follow-up to the December 12, 2017 Enforcement Conference. The District greatly appreciates the opportunity to discuss DNR's concerns regarding chloride, ammonia, BOD, and TSS exceedances at the treatment plant.

As requested at the Enforcement Conference and clarified in a follow-up phone call with you, Yorkville is sending this letter to outline a timeframe in which Yorkville will develop a plan to bring the treatment plant back into compliance with regards to chlorides, ammonia, BOD, and TSS.

Yorkville's commitment to proper operation of its treatment plant was made clear during the Enforcement Conference. To that end, Yorkville will be undertaking the following steps in the future to ensure compliance:

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53701-1784
608.256.0226
888.655.4752
Fax 608.259.2600
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Milwaukee Office
1200 North Mayfair Road
Suite 430
Milwaukee, Wisconsin
53226-3282
414.982.2850
888.655.4752
Fax 414.982.2889
www.staffordlaw.com

- **Future Treatment Plant Operations**. Yorkville will need to make changes to its service system in the future, either through a facility upgrade or service through another municipal sewerage service system. Yorkville anticipates that it will be able to undertake the following timeframe for constructing a plan for future compliance:

    - January 2018: As of January 5, 2017, Yorkville has been working with SEH on a study to evaluate future treatment alternatives. Yorkville and SEH will be evaluating replacement of the clarifier, complete facility upgrade, and other alternatives such as service through another municipal system.

    - April 2018: the Town of Yorkville will be holding a referendum on incorporation as a village.

    - June 2018: If the referendum is successful, a new village board will be selected by June. Once this occurs, Yorkville will have better direction regarding future facility plans.

    - October 2018: Yorkville anticipates that by October 1, 2018, Yorkville will be able to provide DNR with a concrete plan for future plant operations, which will entail either a facility upgrade or plans for retail service.

  Yorkville will continue to keep DNR informed as this process moves foward.

- **Working with Racine County on chlorides exceedances**. As discussed at length during the Enforcement Conference, a significant part of the chlorides problem facing Yorkville arises from the salt storage and usage at the nearby Racine County Highway Department facility. On December 21, 2017, Yorkville met with Nathan Plunkett and Julie Anderson from Racine County to discuss facility planning and maintenance efforts that can reduce the amount of chlorides infiltrating the sewerage system. Racine County has commissioned a facilities plan for 2018, which will include provisions for chloride remediation. Yorkville is awaiting a scope of services from Racine that will outline the facility plan and chloride remediation efforts. Yorkville understands that it will be receiving this scope of services within the next few weeks and will be scheduling a follow-up meeting with Racine County after reviewing the chloride remediation provisions. After this follow-up meeting, Yorkville anticipates that it will be able to put a plan in place in conjunction with Racine County to address salt storage and use and chloride remediation at the facility and will share this plan with DNR.

- **Developing SOPs**. By February 1, 2018, Yorkville will complete and submit to DNR a written Standard Operating Procedure (SOP) for the addition of mixed liquor to the clarifier to address ammonia exceedances. Yorkville will also be developing and sharing with DNR an SOP for clarifier maintenance.

In addition to these plans for future work, Yorkville has already undertaken a number of steps to remedy past exceedances and to ensure such exceedances do not occur in the future. These steps include the following, which were discussed during the Enforcement Conference and which Yorkville will be continuing to implement per the dates outlined below:

- **Water Softener Replacement**. In 2013, Yorkville hired Culligan to visit all customers and assess compliance with water softener regulations. Yorkville has included a line item in its 2018 budget for water softener replacement, and many customers have replaced their water softeners with the help of this program. Yorkville will continue to include this line item in its budget and facilitate customer water softener upgrades.

- **Infiltration**. Since 2009, Yorkville has been spending approximately $20,000 per year on manhole and chimney seal installation in order to combat chloride infiltration. Over the course of this program, Yorkville has installed 40 chimney seals on manholes. Yorkville will put chimney seals on approximately 5 more manholes over the summer of 2018. Yorkville plans to continue this program until every manhole has a chimney seal.

- **Clarifier Maintenance**. In early 2016, Yorkville retained the services of a consultant to conduct monthly servicing of its clarifier in addition to regular in-house maintenance. Since that time, Yorkville has been spending approximately $3,000 per month for this maintenance service, which has addressed the historic BOD exceedances. This monthly maintenance will continue throughout 2018 and for the foreseeable future.

- **Increase of Mixed Liquor Concentration**. Yorkville has begun increasing the mixed liquor concentration in the clarifier in the fall in anticipation of cold weather in order to prevent ammonia exceedances. However, due to the clarifier design, Yorkville must be cautious with increasing the mixed liquor concentration so as to avoid increases in solids in the clarifier that could result in solids limit exceedances.

- **Notification procedures**. Yorkville has put into place an internal reminder system to ensure that DNR is timely notified of any exceedances.

- **Sampling**. Yorkville conducts unannounced sampling of all its industrial and commercial users on a yearly basis. Yorkville discusses any issues that arise during this sampling process with its users. This sampling protocol will occur again over the summer of 2018. As part of this process, Yorkville will review results for BOD, zinc, chlorides, phosphorus, and ammonia from each industrial or commercial user and conduct follow up discussions and inspections where sampling results indicate is necessary.

Yorkville plans to continue these efforts already put into place. With respect to BOD and TSS, these efforts outlined above have substantially remedied the past exceedance issues, which is clear from the fact that there were no BOD or TSS exceedances in 2017.[1]

Yorkville appreciates this opportunity to communitcate with DNR regarding past exceedances. Yorkville will continue to work diligently with DNR to resolve these issues.

Best regards,

STAFFORD ROSENBAUM LLP

Vanessa W.ishart

Vanessa D. Wishart

VDW:mai
Enclosure
cc: Peter Hansen
Gary Hanson
Tim Pruitt
Bryan Hartsook

---

[1] DNR documented one BOD exceedance in its NOV from July 24, 2017. However, as Yorkville explained during the Enforcement Conference, this was a contaminated sample and not an exceedance.

StaffordRosenbaum LLP
Attorneys

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608.210.6307

January 12, 2018

VIA EMAIL

Benton C. Stelzel
Environmental Enforcement Specialist
Wisconsin Department of Natural Resources
141 NW Barstow, Room 180
Waukesha, WI 53188

RE: Yorkville Sewer Utility's Reponse to DNR's January 5, 2018 Enforcment Conference Summary

Dear Mr. Stelzel:

I am writing on behalf of the Yorkville Sewer Utility District No. 1, in response to your Enforcement Conference Summary correspondence from October 30, 2017.

Yorkville appreciates the continued opportunity to work with DNR on this matter. However, Yorkville believes that some of the statements in the summary warrant clarification, in order to ensure the record is reliable and complete. The statements Yorkville would like to clarify are as follows:

- The summary states that "Approximately 35,000 gallons of sludge are hauled from the POTW for disposal yearly." However, Yorkville disposes of about 70,000 gallons per month. In 2017, Yorkville disposed of a total of 910,000 gallons of digested sludge.

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- The summary states that “A select few customers significantly contribute to the POTW. If these select customers exceed their discharge limitations the customers store and haul their processed wastewater for treatment rather than discharging to the POTW.” To clarify, Yorkville has two customers with a volume limit in their discharge permits. Every customer receives a surcharge when they discharge over the allowed ordinance limits.

- The summary states that “It takes the town approximately 6 weeks to test the entire system utilizing a portable testing device.” To clarify, Yorkville owns two portable samplers and a portable flow meter. Yorkville does not sample residential customers.

- The summary accurately describes Yorkville’s water softener testing and replacement program, but omits that Yorkville spent over $10,000 for this program.

- The summary states that “The Town suspects that the RCDoT is a significant contributor to the POTW’s Chloride exceedances.” However, the correct entity is the Racine County Highway Department.

- The statement that “To date the POTW has been upgraded for the treatment of ammonia” is not correct.

Yorkville appreciates the opportunity to clarify the record in this matter.

Best regards,

STAFFORD ROSENBAUM LLP

Vanessa Wishart

Vanessa D. Wishart

VDW:mai

cc: Peter Hansen
Gary Hanson
Tim Pruitt
Bryan Hartsook

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0112181401

RE: Yorkville WWTP NOV/Enforcement Conference Follow-Up - NOV Compliance Alternatives PlanHartsook, Bryan D - DNR to: Harrington, Arthur 10/03/2018 03:25 PM
Cc: "Thielen, Geisa B - DNR", "Stelzel, Benton C - DNR", "Harrington, Arthur", 'Tim Pruitt', Randy Sanford, "Gary Hanson (yorkville_sewer@yahoo.com)", "'dschaefer@sehinc.com'"
From: "Hartsook, Bryan D - DNR" <Bryan.Hartsook@wisconsin.gov>
To: "Harrington, Arthur" <ajharrin@gklaw.com>
Cc: "Thielen, Geisa B - DNR" <Geisa.Thielen@wisconsin.gov>, "Stelzel, Benton C - DNR" <Benton.Stelzel@wisconsin.gov>, "Harrington, Arthur" <ajharrin@gklaw.com>, 'Tim Pruitt' <tpruitt@peglawfirm.com>, Randy Sanford <rsanford@sehinc.com>, "Gary Hanson (yorkville_sewer@yahoo.com)" <yorkville_sewer@yahoo.com>, "'dschaefer@sehinc.com'" <dschaefer@sehinc.com>

Art,

We received the NOV Compliance Alternatives Plan prepared by SEH and your cover letter. We will review in detail, but based on a cursory review - - the recommended alternative and implementation schedule will appear to meet everyone's needs. Thanks again.

Bryan

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Bryan Hartsook, P.E.
Wastewater Field Supervisor – Water Quality Bureau
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bryan.hartsook@wisconsin.gov

dnr.wi.gov

From: Dan Schaefer <dschaefer@sehinc.com>
Sent: Monday, October 01, 2018 5:10 PM
To: Hartsook, Bryan D - DNR <Bryan.Hartsook@wisconsin.gov>
Cc: Thielen, Geisa B - DNR <Geisa.Thielen@wisconsin.gov>; Stelzel, Benton C - DNR <Benton.Stelzel@wisconsin.gov>; Harrington, Arthur <ajharrin@gklaw.com>; 'Tim Pruitt' <tpruitt@peglawfirm.com>; Randy Sanford <rsanford@sehinc.com>; Gary Hanson (yorkville_sewer@yahoo.com) <yorkville_sewer@yahoo.com>
Subject: Yorkville WWTP NOV/Enforcement Conference Follow-Up - NOV Compliance Alternatives Plan

Good Afternoon Bryan,

Attached you will find a cover letter from Godfrey and Kahn, who is representing the Yorkville Sewer Utility District in connection with the above referenced NOV, as well as an NOV Compliance Alternatives Plan prepared by SEH on behalf of the District, per today's agreed upon date to submit a plan for WDNR review.

Please direct questions and comments to Art Harrington at Godfrey and Kahn.

I will also send hard copies to your attention in the mail tomorrow.

Thank you,

Dan Schaefer, PE (CO, NC, WI) | Senior Professional Engineer
SEH | 809 North 8th Street, Suite 205 | Sheboygan, WI 53081
920.287.0829 direct | 262.305.2509 cell | 888.908.8166 fax
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SEH--Building a Better World for All of Us®

RE: Yorkville WWTP NOV/Enforcement Conference Follow-Up - NOV Compliance Alternatives PlanThielen, Geisa B - DNR to: Dan Schaefer, Hartsook, Bryan D - DNR
10/24/2018 04:07 PM
Cc: "Stelzel, Benton C - DNR", "Harrington, Arthur", 'Tim Pruitt', "Randy Sanford", "Gary Hanson (yorkville_sewer@yahoo.com)"
From: "Thielen, Geisa B - DNR" <Geisa.Thielen@wisconsin.gov>
To: Dan Schaefer <dschaefer@sehinc.com>, "Hartsook, Bryan D - DNR" <Bryan.Hartsook@wisconsin.gov>
Cc: "Stelzel, Benton C - DNR" <Benton.Stelzel@wisconsin.gov>, "Harrington, Arthur" <ajharrin@gklaw.com>, 'Tim Pruitt' <tpruitt@peglawfirm.com>, "Randy Sanford" <rsanford@sehinc.com>, "Gary Hanson (yorkville_sewer@yahoo.com)" <yorkville_sewer@yahoo.com>
Follow Up:
Normal Priority.

Dan,

I have reviewed the report and concur with Bryan that the alternative selected is sufficient. My only question would be for future phosphorus compliance, would a tertiary treatment be added to the SBR or would a whole new plant be built (which would also help with future growth)?

Thanks!

We are committed to service excellence.
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Geisa Thielen
Phone: (414)-263-8525
Geisa.Thielen@wisconsin.gov

From: Dan Schaefer <dschaefer@sehinc.com>
Sent: Monday, October 1, 2018 5:10 PM
To: Hartsook, Bryan D - DNR <Bryan.Hartsook@wisconsin.gov>
Cc: Thielen, Geisa B - DNR <Geisa.Thielen@wisconsin.gov>; Stelzel, Benton C - DNR <Benton.Stelzel@wisconsin.gov>; Harrington, Arthur <ajharrin@gklaw.com>; 'Tim Pruitt' <tpruitt@peglawfirm.com>; Randy Sanford <rsanford@sehinc.com>; Gary Hanson (yorkville_sewer@yahoo.com) <yorkville_sewer@yahoo.com>
Subject: Yorkville WWTP NOV/Enforcement Conference Follow-Up - NOV Compliance Alternatives Plan

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Please direct questions and comments to Art Harrington at Godfrey and Kahn.

I will also send hard copies to your attention in the mail tomorrow.

Thank you,

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Appendix I

AECOM 2015 Regionalization Cost Analysis

AECOM
1555 N RiverCenter Drive, Suite 214
Milwaukee, WI 53212
414.944.6080 tel
414.944.6081 fax

Memorandum

To	Mr. Peter Hansen, Town Chair	Page	1
CC	Gary Hanson, Wastewater Plant Operator		
Subject	Town of Yorkville Wastewater Treatment Plant Capacity Analysis		
From	Chuck Boehm		
Date	May 5, 2015		

In 2014, the Town of Yorkville hired AECOM to provide Engineering Services related to evaluating the capacity of the Town of Yorkville Wastewater Treatment Plant in four specific areas:

1. Confirmation of the existing sewer service area boundary
2. Estimate existing plant capacity and ability to modify plant capacity
3. Identify regulatory requirements/conditions for expansion
4. Identify potential expansion area, land use, and flow increases

The intent of this study is to investigate the aforementioned areas and determine if future expansion of the service area is a viable alternative prior to taking any next steps.

Confirmation of Existing Sewer Service Area Boundary

Confirmation of the existing sewer service area boundary would seem to be a relatively straightforward task; however, it appears that a detailed sewer service area was never fully established with the Southeastern Wisconsin Regional Planning Commission (SEWRPC). An area representing the Yorkville sewer service area is shown on Map 1 - Recommended Sanitary Sewer Service Areas in the Region: 2000 (Sanitary Sewer Service Area for the City of Racine and Environs Community Assistance Planning Report No. 147, SEWRPC 1986) – see attached figure.

This area is further detailed on Map 2 - Study Area Identified for Purposes of Revising the City of Racine and Environs Sanitary Sewer Service Area (Sanitary Sewer Service Area for the City of Racine and Environs Community Assistance Planning Report No. 147 (2^{nd} Edition), SEWRPC 2003.) Map 4 of this same document refers to the area in question as the Yorkville Sanitary Sewer Service Area (partially refined) and also shows an area east of I-94 which is to be detached from the Town of Yorkville and Attached to the Racine Sewer Service Area (Timing to be determined by local officials) – see attached figure.

An Amendment to the Regional Water Quality Plan Village of Caledonia (as Adopted by SEWRPC June 2009) shows the same areas on Map 4 of the amendment as the 2003 report. No further changes in the sewer service area are formally approved or documented at this time with SEWRPC.

Therefore, while SEWRPC has indicated that the boundary was never fully defined and is currently identified as "partially refined", the current generally accepted boundary is as shown in the most recent reports. No additional sewer service area boundary changes regarding the Town of Yorkville are documented through SEWRPC, including the area that is identified as to be detached.

Future modifications to the sewer service area boundary must be made through SEWRPC to amend the boundary since SEWRPC considers the Yorkville sewer area as partially defined or refined. The Town would need to request establishing a detailed sewer service area.

Estimate Existing Plant Capacity and Ability to Modify Plant Capacity

Part of the effort to establish a detailed (and expanded) sewer service area would include showing that the plant has capacity to accommodate the flows (in its current or modified capacity). This would be based on Average Daily Flow according to SEWRPC, although other peak flows should be evaluated because of the restriction on sanitary sewer overflows.

Previous Capacity Study

The Yorkville Utility District – Capacity Study completed by AECOM in October 2005 looked at historical population figures back to 1960, year 2005 population estimate and projected population over the next 20 years, through year 2025. Only portions of the town are connected to the sanitary sewer system. The Wisconsin Department of Administration estimated an overall Town of Yorkville population increase of 14% during the planning period. However, taking this into consideration and using their population figures since 1990, the town population has been increasing at a rate of 2.8% every five years.

The study also considered past and projected future population for Racine County. Two population growth rates were utilized to estimate the intermediate and ultimate population of the county. The Wisconsin Department of Administration forecasted a 20-year increase of 11.9%, whereas the Southeastern Wisconsin Regional Planning Commission forecasted a 9.7% increase over the same period. The study utilized the average of 10.8% rate of population increase. This rate was ultimately used for the projected Town of Yorkville population rate of increase.

Estimates of overall wastewater flows for the Town of Yorkville in the town was computed with known residential impacts and commercial and industrial flows based on the equivalent housing unit (EHU) system. An appropriate flow reduction was also applied to account for the anticipated removal of drainage area along the east side of IH-94.

The capacity study indicated that the treatment plant was designed for extended aeration activated sludge with the following design rating:

Average Daily Flow	=	150,000 gallons per day (gpd)
Average BOD Loading	=	255 pounds per day (ppd)
Average TSS Loading	=	278 ppd

Based on these population growth rates, design flow tables and projected values included in the referenced report (Table 3-2) were modified to generate the summary information presented in Table 1 with interpolated year 2014 data. Actual data for 2005 is based on the Capacity report.

Daily Monitoring Reports (DMRs) were also reviewed for year 2010 and available YTD reports for 2014 (through August) as a comparison to previously projected 2010 and interpolated 2014 design values in the capacity study.

Current 2014 plant flows are averaging 65,225 gpd, BOD_5 is 57 ppd and TSS is 60 ppd based on monthly DMRs from January 2014 through August 2014 (latest data available to AECOM) -- all well below projected values interpolated to 2014 levels. After applying peaking factors (PF) from Table 3-2 of the Capacity Study report (Flow PF of 1.2, BOD_5 & TSS: PF of 1.4), the maximum monthly levels are 78,270 gpd for flow, 80 PPD for BOD_5, and 84 PPD for TSS - all still significantly lower than the design capacity ratings.

As indicated in the following table, based on daily averages, actual total plant inflow levels versus projected design values are at roughly 72% (2010) and 75% (2014), BOD_5 is 58% (2010) and 24% (2014) of design, and TSS is 20% (2010) and 28% (2014) of design.

Table 1
Projected and Actual Wastewater Treatment Plant Loading
Town of Yorkville

Year	Projected Flow (gpd)	Actual Avg Daily Flow (gpd)	Projected BOD-5 (lb/day)	Actual BOD-5 (lb/day)	Projected Total P (lbs/day)	Actual Total P (lbs/day)[1]	Projected TSS (lb/day)	Actual TSS (lb/day)
2005	-	81,900[2]	224	N/A	5	N/A	224	N/A
2010	72,700	52,570[3]	199	110	4	N/A	181	39
2014[4]	86,540	65,225	237	57	5	1.8-3.1	215	60

[1] Actual Total P was not measured until 2013. 2014 values display loads based on a range of reported effluent grab samples from January to August.
[2] Yorkville Utility District – 2005 Capacity Study: Table 3-2
[3] Actual flows decreased due to the deletion of commercial flows from the Mount Pleasant Border Agreement adopted by the Caledonia Village Board of Trustees on May 19, 2009.
[4] 2014 values interpolated from Yorkville Utility District – 2005 Capacity Study

During a spring rain event in May of 2014, several wastewater treatment plants saw considerable increased flows. This was also the case for Yorkville which saw flows at or near the hydraulic load capacity from May 13-15, 2014 where flows were 147,840, 128,040 gpd, and 133,320 gpd respectively based on the May 2014 DMR. The storm event itself varied in different areas as storm cells passed over the area. The fact that flows jumped from 48,840 gpd on May 12th to 147,840 gpd on May 13th and held at over 100,000 gpd for 3 days indicates that the ground was fully saturated and that I/I can still heavily influence the system.

Recent Efforts to Reduce Flows

Over the past several years, the Town of Yorkville has taken steps to proactively manage flows to the wastewater treatment facility.

An element of this was the recent effort to reduce inflow and infiltration in the conveyance system. Approximately half of the sewer system has been regularly scheduled for inspection every two years with noted leaks grouted and sealed. In addition, $20,000 has been budgeted annually over the last four years with 50 manholes rehabilitated to date, including poly grade rings, external chimney seals and plastic liners on the manhole covers to seal pick hole openings. These efforts reduce clear water flows to the plant, allowing more efficient treatment of wastewater at the facility, reduced electrical and overall operating costs and also reserves hydraulic capacity in the conveyance system and treatment plant for wastewater.

Additionally, the small area noted in the previous section consisting of approximately 60 acres near the intersection of STH 20 and IH 94 in the Town of Mt. Pleasant that was served under contract by the Town of Yorkville Sewer Utility District No. 1 sewage treatment plant was removed from the Yorkville service area and added to the Racine service area within approximately the past five years.

The combination of these efforts, as well as changes in output of industrial flow characteristics and water use are likely the reasons why actual flows and loadings have lagged the levels projected in the 2005 capacity study.

Phosphorus Rule and Operational Evaluation Report

The Town of Yorkville received a renewed NPDES permit in 2013 containing a 9-year compliance schedule to comply with very stringent NR217 effluent phosphorus limits. The WDNR has calculated that the WWTP must limit effluent phosphorus to a monthly average basis of 0.225 mg/L and a 6-month average of 0.075 mg/L.

In 2014, the State of Wisconsin passed Senate Bill (SB) 547 creating 2013 Wisconsin Act 378. As a result, AECOM recommends that the Town of Yorkville submit a variance request for phosphorus to the WDNR which would allow them up to 4 permit terms (20 years) to achieve WQBEL (water quality based effluent limit) phosphorus compliance. The variance would allow point-source phosphorus discharges in excess of 0.2 mg/L average; however, discharge limits would become increasingly stringent with each successive permit toward compliance. During the variance period, the Town of Yorkville would be required to pay Racine County $50 annually for every pound of phosphorus over the limit to a maximum penalty of $640,000, subject to periodic increases based on the U.S. consumer price index. The payments would be applied toward the county’s efforts to reduce non-point source discharges. In the interim, it is recommended that they continue to plan for phosphorus optimization and reduction according to its current permit compliance schedule indicated in the Phosphorus Operational Evaluation Report (AECOM, March 2014).

Yorkville began a phosphorus sampling program in the summer of 2013 to identify the major commercial and industrial phosphorus contributors to assist in source reduction measures. They have also since proposed to follow the aforementioned compliance schedule to further develop the phosphorus removal performance plan at the facility. These measures include the following:

1. Initiate Study of Feasible Alternatives: March 31, 2014
2. Commercial and industrial phosphorus sampling program (Second Round): May 1, 2014 to December31, 2014
3. Bench scale jar testing of ferric chloride and polymer: September 30, 2014 to October 31, 2014

4. Full scale pilot testing of ferric chloride and polymer addition in the activated sludge system: November 1, 2014 to November 30, 2014. If at any time, the pilot test causes detrimental effects on the plant's effluent quality, the pilot test will be discontinued.
5. Digester supernatant monitoring program: September 30, 2014 to November 30, 2014
6. Compliance Alternatives, Source Reduction, Improvements and Modification Status Report that will evaluate the results from all of the activities listed above: November 1, 2014 to February 28, 2015

These new regulations and permit conditions are a challenge for the town because the current wastewater treatment plant is not designed for phosphorus removal. In 2014, the Town hired AECOM to review the facility's past performance in light of the new phosphorus regulations. The report reviewed current operational data, wastewater sources and discussed phosphorus removal alternatives for treatment and optimization actions for the town to consider for further evaluation. Based on the current levels of phosphorus and the utility's past performance, it is believed that the Town of Yorkville will not be able to meet the new, more restrictive phosphorus limits without significant upgrades to the WWTF. A combination of source reduction measures, facility modifications and a significant tertiary treatment addition may be required to comply with future effluent phosphorus limitations.

Potential Growth Considerations

Zoning Totals

The existing Town of Yorkville service area is presented in the figure entitled Yorkville Service Area and includes the area enclosed within the red service boundary line consisting of 765 acres of land. Table 2 includes currently used land areas zoned as commercial/business, industrial, open/conservancy, park/recreational and residential. It should be noted that the total land area included in the table is only 634.36 acres. Rezoning changes over the years have resulted in reclassification of approximately 51 acres to industrial land and approximately 80 acres to residential land, accounting for the balance. None of the rezoned land is currently utilized.

Existing Land Use Flows

The estimated existing Town of Yorkville flow was determined in Table 2, using prescribed hydraulic usage by zoning categories as shown. Low-density residential of approximately 2.5 persons per acre, and low residential, commercial and industrial usage rates were applied to simulate existing conditions. The resulting average daily flow of 79,630 gpd is approximately 22% higher than the average daily total rate of 65,225 gpd from the 2014 Yorkville DMRs. AECOM's opinion is that the calculated flow is not considered grossly conservative and will therefore be used as a reasonable basis of actual flow for the service area.

Treatment plant hydraulic loading criteria was determined by applying a peaking factor of 4.0 established in NR 110.15, Table 2. The resulting peak hourly flow of 318,520 gpd exceeds the existing plant flow capacity of 194,400 gpd in the 2005 Capacity Study. Even though actual flows are somewhat lower, the estimated flow suggests that plant expansion may be required in the near future.

Table 2
Existing Wastewater Treatment Plant Flows

Zone	Type	Area ft2	Acres	Population[1]	Gal/ac/day (ind & com)	Gpcpd	Flow
Commercial/Business	Existing Service	8,033,378	184.42		250		46,105
Industrial	Existing Service	6,817,103	156.50		100		15,650
Open/Conservancy	Existing Service	2,642,089	60.65		0		
Open/Conservancy	Existing Service	36,662	0.84		0		
Park/Recreational	Existing Service	4,400,327	101.02		0		
Residential	Existing Service	5,702,900	130.92	325		55	17,875
			634.36				
						Total	79,630 gpd

1. Population estimate from SEWRPC, developed for the 2006 IH94 Corridor Study

Fully Developed Existing Service Area Flows

Table 2 was modified to estimate the flow generated after the existing service area is fully-developed. Modifications included development of additional infill in the rezoned areas of approximately 51 acres of industrial land and approximately 80 acres of residential land. Future residential build-out applied a higher than existing density of 6 housing units per acre and 2.5 persons per housing unit, resulting in an additional 1,196 residents. Anticipated flow to the plant under full development of the non-expanded service area is 150,502 gpd as shown in Table 3.

Table 3
Fully-Developed Wastewater Treatment Plant Flows

Zone	Type	Area ft2	Acres	Population[1]	Gal/ac/day (ind & com)	Gpcpd	Flow
Commercial/Business	Existing Service	8,033,378	184.42		250		46,105
Industrial	Existing Service	6,817,103	207.42		100		20,742
Open/Conservancy	Existing Service	2,642,089	60.65		0		
Open/Conservancy	Existing Service	36,662	0.84		0		
Park/Recreational	Existing Service	4,400,327	101.02		0		
Residential	Existing Service	5,702,900	210.66	1521		55	83,655
			765.02				
						Total	150,502 gpd

1. Population estimate from SEWRPC, developed for the 2006 IH94 Corridor Study

The 2005 Capacity Study indicated that the treatment plant was designed to process 150,000 gpd of average daily flow and the existing raw wastewater pump station at the treatment plant has a firm capacity (with one unit on standby) of 135,000 gpd. Also indicated was that the peak hourly flow capacity (maximum flow rate with 1 unit out-of-service) was 194,400 gpd. The Capacity Study further concluded that the raw wastewater pump station is not adequate for current 2005 (81,900 gpd average daily flow and 287,000 gpd based on PF of 3.5) or projected peak hourly flows, based on a projected year 2025 average daily design flow of 103,000 gpd indicated in the study. It is also understood that the projected 2025 flows did not include development of the infill areas.

It is now apparent that the future design flow capacity of 360,500 gpd determined in the 2005 Capacity Study would no longer be adequate for future built-out peak hourly flow of 602,008 gpd.

Expanded Service Area Zoning

The approved expanded Town of Yorkville service area is presented in the figure entitled Yorkville Service Area and includes the area enclosed within the blue service boundary line consisting of 1,850.50 acres of land. Zoning totals for the expanded service are presented in Table 4.

Table 4
Expanded Service Area Zoning Totals

Zone	Type	Area ft^2	Acres
Commercial/Business	Existing Service	8,033,378	184.42
Commercial/Business	Expansion Service	18,303,859	420.20
Industrial	Expansion Service	24,522,099	562.95
Industrial	Existing Service	6,817,103	156.50
Industrial	Changed Existing Service	2,217,861	50.92
Open/Conservancy	Existing Service	2,642,089	60.65
Open/Conservancy	Expansion Service	3,765,596	86.45
Open/Conservancy	Existing Service	36,662	0.84
Park/Recreational	Existing Service	4,400,327	101.02
Residential	Existing Service	5,702,900	130.92
Residential	Changed Existing Service	3,473,678	79.74
Residential	Expansion Service	691,729	15.88
		Total Zoned Acreage	1,850.50

Projected Range of Flows

Using the fully developed existing and expanded service area zoning totals, tables projecting anticipated flow rates to the plant were designed under two different flow usage scenarios – namely :”Low” and “High”. These two limits are intended to predict a range of flow rates for different commercial/business and industrial loading situations, depending on the type of business/industry and the degree of water dependency. The low range used 750 gal/acre/day for low-end commercial/business usage and 250 gal/acre/day for low-end industrial usage, based on records from the similar small community of Fountain, Wisconsin.

The high range used 2,100 gal/acre/day for high-end commercial/business usage and 3,000 gal/acre/day for high-end industrial usage, based on records from Madison, Wisconsin.

The resulting flow range for low-end to high-end usage is summarized in Table 5.

Table 5
Average Daily/Peak Hourly Flow Range under High/Low Usage

Condition		Average Annual Daily Flow (gpd)	Peak Hourly Flow Rate (gpd)
Low End	Existing Flows (Actual 2014 DMR Average Daily)	65,225	260,900
	Residential & Industrial Infill Flows	108,422	433,690
	Expanded Commercial/Business, Industrial & Residential Flows	474,942	1,899,770
	Total Flows Expected	**648,589**	**2,594,356**
High End	Existing Flows (Projected Existing from Table 2)	79,630	318,520
	Residential & Industrial Infill Flows	272,362	1,089,448
	Expanded Commercial/Business, Industrial & Residential Flows	2,595,087	10,380,348
	Total Flows Expected	**2,947,079**	**11,788,316**

Identify Regulatory Requirements/Conditions for Expansion

The Town of Yorkville’s Wastewater Discharge Permit is silent on any specific regulatory requirements or condition for expansion of the wastewater plant and associated facilities. However, current regulations require a current CMOM plan has been performed and the program has been implemented.

A request for expansion would need to be reviewed by SEWRPC. On October 22, 1993, the Town sent a request for sewer service area expansion to SEWRPC. They responded in a letter on November 16, 1993 to the request with several conditions/considerations to the request.

It has been presented in several different reports and circumstances that, in addition to the aforementioned area east of I-94 that is currently identified in sanitary sewer service area plans to be connected to the City of Racine sewage treatment plant through a Town of Mount Pleasant interceptor sewer with a “timing to be determined by local officials”, Page 21 of the 2nd Edition of Planning Report No. 147 states “In the long-term, the entire Yorkville system is anticipated to be connected to the sewerage system tributary to the Racine sewage treatment plant-and the Yorkville sewage treatment plant abandoned - when the Yorkville plant reaches the end of its useful life, pending cost-effectiveness analysis to be conducted at that time."

From discussion with SEWRPC during this study, it was relayed that proposed plant upgrade alternatives must be compared to the regional alternative identified in previous planning studies which is the connection to the City of Racine wastewater system and plant and presented as a facilities plan. Showing that it is more cost effective to upgrade the Yorkville plant compared to connecting to Racine would be an essential part of this analysis.

Further overall work will be required to identify which areas of the sanitary service basin are developed, the type of zoning and development plans for the remaining area. This will further refine ultimate flow generated within the basin and required construction to accommodate it. Coupled with expenditures to comply with phosphorus limits, the Town of Yorkville will need to complete an analysis to determine cost effectiveness of upgrading and expanding the Town of Yorkville's Sewer Utility District No. 1 sewage treatment plant versus that of connecting to the City of Racine sewerage system.

While the 2005 Capacity Report suggested that plant modifications were fiscally practical compared to the regional recommended plan for connection to the City of Racine wastewater system and plant, the recent regulation and analysis related to phosphorus was not a factor in that study. The recent phosphorus report did not identify the extent or cost of wastewater treatment plant expansion needs to meet the phosphorus limits. This will be a critical component to future efforts to evaluate options for the expansion of the existing plant and the ability to serve customers under the current or expanded service area.

Conclusions

Summary of Findings

The following key points are noted based on the research and analysis by AECOM to date for the Yorkville Wastewater Utility:

1. The service area as shown on recent reports and as attached to this memorandum represents what SEWEPC considers to be a "partially defined or refined" boundary.
2. The Town of Yorkville has expended efforts to reduce inflow/infiltration in the system over the past several years and a former contract connection to the utility east of I-94 is no longer being served by the plant.
3. Actual plant flows and loadings appear to be generally under those projected in the 2005 Capacity Study. That study also identified potential modifications and costs to expand the plant to manage projected future flows.
4. Although daily flows and loadings are generally under the design and projected loadings, the system is not immune to the influence of I/I which saw plant flows at or near full capacity in May of 2014.
5. Wastewater treatment plant expansion discussed in the 2005 Capacity Study would increase plant capacity to 360,500 gpd. The existing estimated flow is 79,630 gpd and amounts to 318,520 gpd under peak hourly flow (peaking factor of 4.0). The noted expansion is marginally sufficient to handle existing peak hourly flows. When buildout of

the existing service area is completed, the anticipated peak hourly flows of 602,008 gpd at the plant will exceed the expanded plant capacity by about 67%.

6. Recent State of Wisconsin legislation had imposed a new and very restricted phosphorus limit on all wastewater plants. The current plant is not equipped to reduce phosphorus to the level that is required and a recent study indicates that it will not be able to meet the requirement without significant modifications. No specific recommended improvements or costs to meet the regulation were identified in the recent study.
7. From discussion with SEWRPC during this study, it was relayed that proposed plant upgrade alternatives must be compared to the regional alternative identified in previous planning studies which is the connection to the City of Racine wastewater system and plant and presented as a facilities plan. Showing that it is more cost effective to upgrade the Yorkville plant compared to connecting to Racine would be an essential part of this analysis.
8. Considering development of the expanded service area, it is clearly apparent that the existing or expanded plant flow capacity is inadequate to serve the sanitary needs of the Town of Yorkville. Other loading factors, especially phosphorus quantities, will also exceed the plan's treatment capabilities. If the Town wishes to proceed with further calculations related to expanding the sanitary sewer system to evaluate the potential impact on flows at the plant, a follow-up effort will be required to evaluate the cost of modifications at the plant based on flows and influent parameters, particularly phosphorus.
9. Finally, neither the DNR nor SEWRPC will entertain any requests for service area of wastewater treatment plant capacity expansion without a comprehensive facilities plan, including detailed hydraulic, solids, BOD, chlorides and phosphorus loadings.

Plant Updates Performed

Several treatment plant upgrades have been performed in the interim between the 2005 Capacity Study and the present, including the following:

- Emergency generator replacement
- Lift station replacement
- Bar screen replacement
- Final clarifier replacement

It should be noted that although these upgrades benefit the longer term reliability of the plant, they do not increase the flow capacity.

Description and Cost of Recommended Plant Expansion

The recommended alternative for plant expansion from the 2005 Capacity Study included the following upgrades:

- Upgrade the existing raw wastewater pumping station to 360,500 gpd
- Upgrade existing aeration processes
- Construct a new covered clarifier

Capital and O&M expenditures for plant expansion were updated for 2015 costs using a CPI increase of approximately 17% in the interim, resulting in the following:

- Capital construction costs $ 966,000
- Annual O&M $ 277,000
- O&M Present Worth $3,338,900

Connection to City of Racine Regional Wastewater System

The alternative to expansion and upgrade of the Town of Yorkville wastewater treatment plant is the connection to the City of Racine Regional Wastewater Facility as discussed at the beginning of this memorandum. As the SEWRPC recommended ultimate plan, Yorkville would need to evaluate this option when investigating other alternatives. This involves co-ordination with two entities, the Village of Mount Pleasant, and the City of Racine Wastewater Utility (RWWU).

Discussions with these two entities as a part of this overall study have led to the following conclusions:

1. Yorkville is currently not a part of the "Racine Area Intergovernmental Sanitary Sewer Service, Revenue Sharing, Co-operation and Settlement Agreement".
2. In the planning of the City of Racine Wastewater Treatment Plant (WWTP), capacity was developed for current members of the agreement as well as for future growth that included connection of the Town of Yorkville.
3. As the Town of Yorkville did not sign onto the agreement, the Village of Mount Pleasant purchased the additional capacity at the WWTP that was built for the Town of Yorkville.
4. The Village of Mount Pleasant constructed an interceptor sewer along Highway 20 to convey flows to the City of Racine WWTP.
5. The Village of Mount Pleasant and the Village of Caledonia have a separate agreement for the use of the Village of Mount Pleasant interceptor system. That agreement was recently amended. The agreement establishes a number of items including capacity reservation, monitoring, maintenance, and cost sharing of the system.
6. The Village of Mount Pleasant is open to discussion with the Town of Yorkville regarding potential connection to the interceptor.
7. The Town of Yorkville would need to be brought into the Racine Area Intergovernmental Agreement and establish agreement with the Village of Mount Pleasant similar to what was developed between the Villages of Caledonia and Mount Pleasant. This could include additional cost items such as administrative, legal, engineering studies and or agreement revisions that would need to be paid by the Town within 60 days of being invoiced by RWWU.
8. The Town of Yorkville will need to purchase plant capacity (most likely from Mount Pleasant) in order to connect to the collection system. This would be in addition to the cost to connect to the interceptor for conveyance.
9. Costs to the Town of Yorkville include: a) connection fee for establishing a connection to the Village interceptor (specific cost not currently identified but expect it to be proportional to anticipated flow to the interceptor); b) transmission/conveyance fee for wastewater

conveyed through the interceptor (assume based on peak flows and would include components for routine operation and maintenance of the interceptor and prorated capital funding for future upgrade and improvements based on projected future flow components, prorated accordingly); and 3) City of Racine Wastewater Utility treatment charges.

10. The schedule to accomplish incorporating the Town of Yorkville into the sewer agreement could take several months to conclude all the discussions of the agreements with the various parties involved. The Town should expect a process that can last up to 18 months. The review will likely include an overview and comment by SEWRPC and perhaps other agencies such as the WDNR.

In addition to the above information, the Town of Yorkville requested some additional information from the City of Racine Wastewater Utility (RWWU) regarding potential options for maintenance or ownership of the Town's wastewater system. In discussion with RWWU, the following information was obtained:

1. The RWWU provides emergency response services associated with the sanitary sewer system to the City of Racine, Village of Sturtevant, and the Village of Mount Pleasant. RWWU is a clearinghouse for basement backup calls and related emergency response investigations. Calls are then forwarded to the respective communities to respond to their individual emergency situations. RWWU would be willing to provide this service to the Town of Yorkville.
2. The RWWU would be willing to assist the Town of Yorkville with other related sanitary sewer services such as sewer cleaning, routine operation and maintenance, and other support services if deemed agreeable to both parties through a memorandum of understanding or other agreement. While not explored at this time, it may be possible for Mount Pleasant or Sturtevant to provide maintenance of the Yorkville collection system.
3. The RWWU currently only owns interceptor sewers within the City of Racine with local collector sewers owned by the City or Racine. The RWWU is not interested in purchasing the Town of Yorkville's sanitary sewer system and/or wastewater treatment plant at this time.
4. Given the current situation with the Town of Yorkville, the current value of the plant and sewer assets is likely to be quite low. If the RWWU were to consider taking on any external assets they would likely need to be inspected, (cleaned, televised, and rated) as potentially rehabilitated prior to any transfer of ownership which would be costly.

Next Steps

The Town of Yorkville has been diligent in performing work to reduce infiltration and inflow of their local sewer system. It is imperative that Yorkville continues to inspect and rehabilitate I/I sources to decrease clear water entering the system and preserving capacity for wastewater.

Although capacity at the treatment plant has not yet been exceeded, it has been reported that the local sewers have been operating in a surcharged condition during certain wet-weather conditions. No instances of basement flooding or bypass pumping have been reported, but close monitoring is recommended.

Existing commercial/business and industrial development has resulted in relatively low flow contributions. However, it is recommended that the Town remain wary and strongly consider future development of water-intensive industries.

The full scope and cost of maintaining the Town of Yorkville wastewater treatment plant is not fully understood for a number of reasons, including the need to incorporate treatment sufficient to meet future phosphorus discharge levels. It is our understanding that a phosphorus treatment analysis and rough cost estimate was developed by Milwaukee School of Engineering Students. The full scope of work necessary to maintain and expand the Town's wastewater treatment plant would require the formal development of a facilities study that would include expansion of the plant to manage future development within the existing sewer service area and that associated with any potential expansion of the sewer service area in addition to meeting known regulatory requirements.

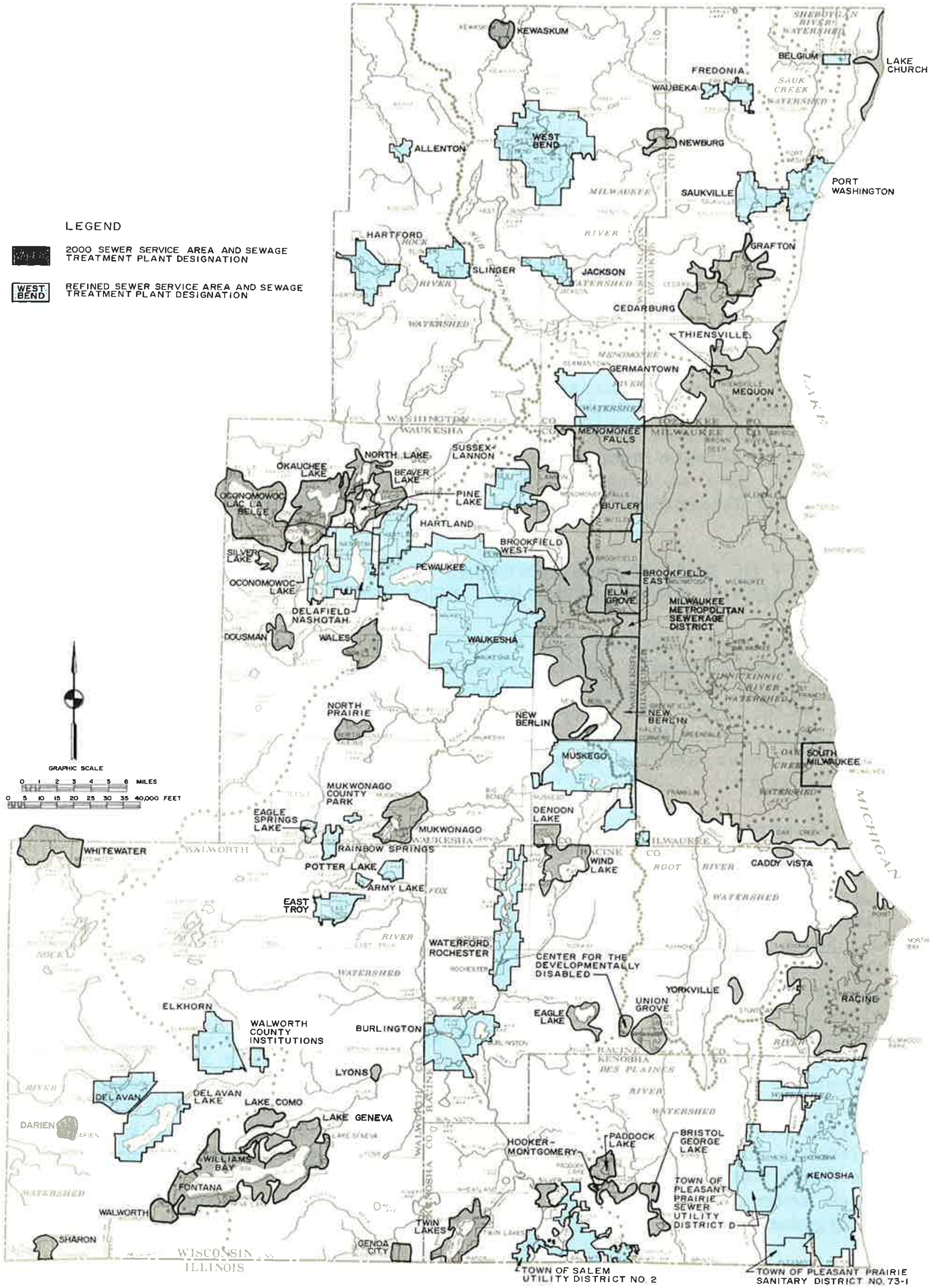
At least one alternative would be required which is evaluation of the costs to connect to the City of Racine regional wastewater system. A summary of probably cost items associated with connecting to the City of Racine regional wastewater system is included in the Connection Fee Analysis as an attachment to this memorandum.

ATTACHMENTS

Sewer Service Area Figures

Map 1

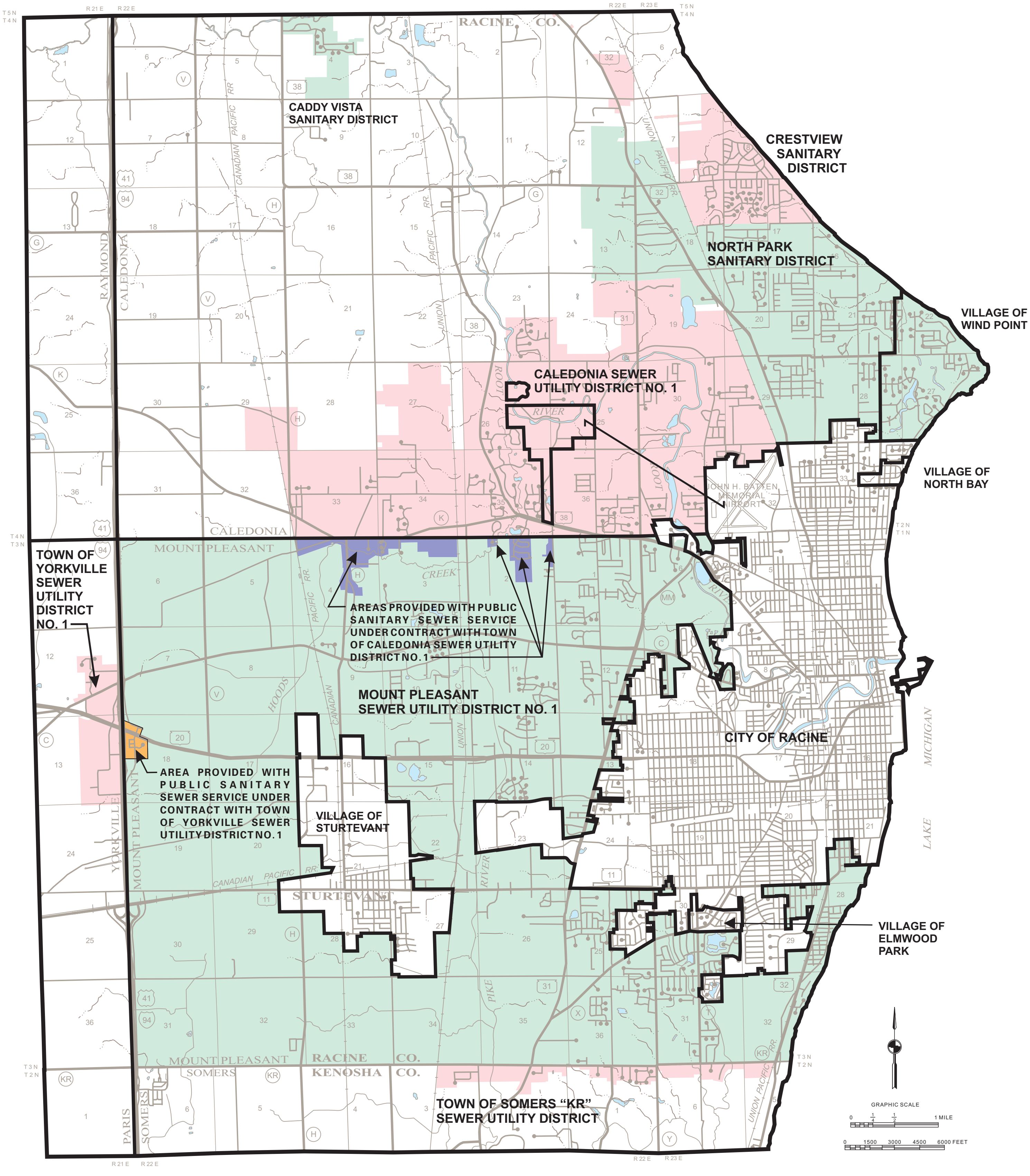
RECOMMENDED SANITARY SEWER SERVICE AREAS IN THE REGION: 2000



Source: SEWRPC.

Map 2

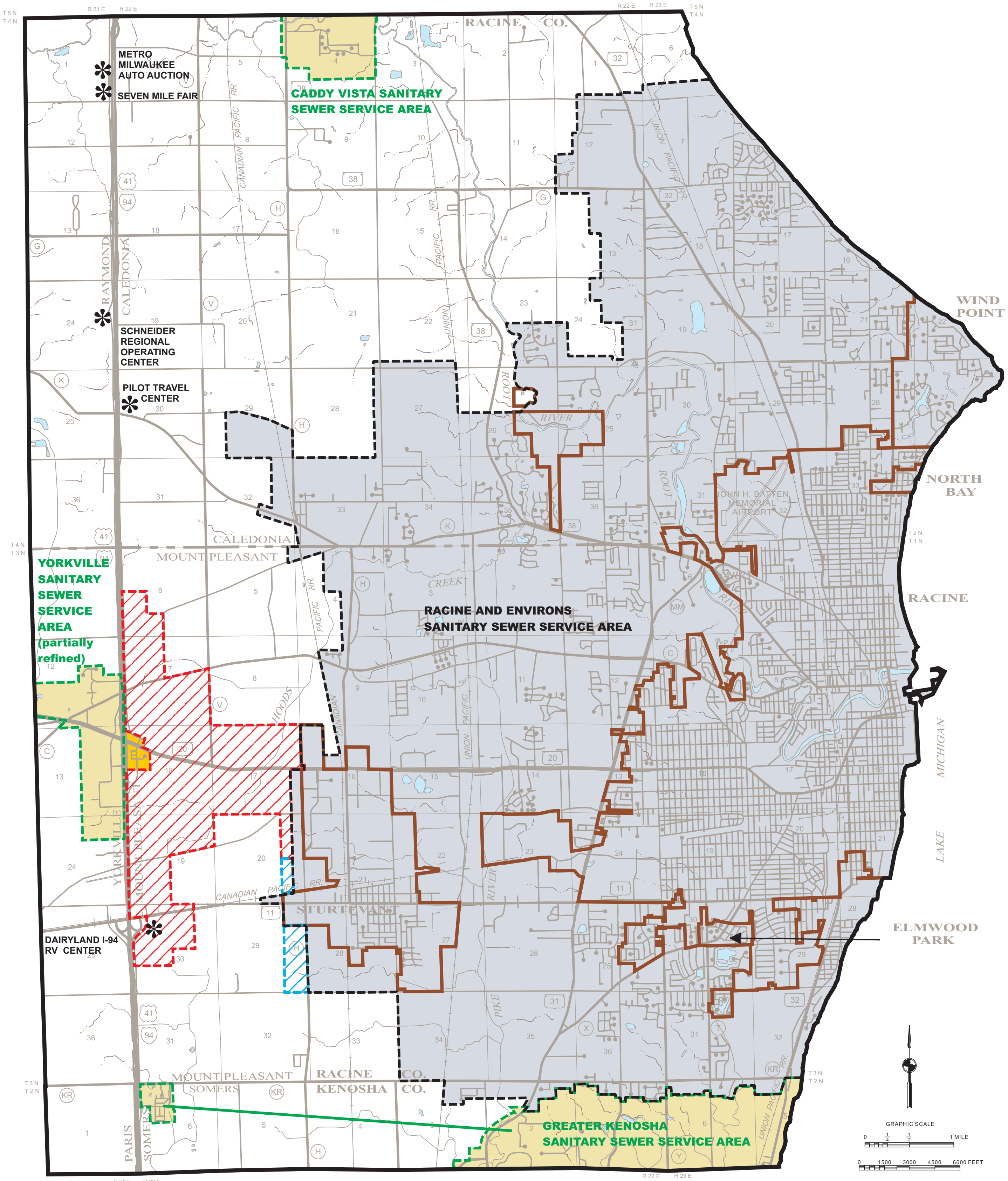
STUDY AREA IDENTIFIED FOR PURPOSES OF REVISING THE CITY OF RACINE AND ENVIRONS SANITARY SEWER SERVICE AREA



Source: *SEWRPC.*

Map 4

PROPOSED CHANGES TO THE CITY OF RACINE AND ENVIRONS SANITARY SEWER SERVICE AREA
(Pre-Public Hearing)



PRESENTLY ADOPTED RACINE AND ENVIRONS SANITARY SEWER SERVICE AREA AS DEFINED IN SEWRPC COMMUNITY ASSISTANCE PLANNING REPORT NO. 147, AS AMENDED

LOCATIONS WITH HOLDING TANK WASTES ACCEPTED BY THE CITY OF RACINE SEWAGE TREATMENT FACILITY (ALSO INCLUDES NORTH CAPE ELEMENTARY SCHOOL IN THE TOWN OF RAYMOND–NOT SHOWN)

OTHER SANITARY SEWER SERVICE AREAS

AREAS PROPOSED TO BE ADDED TO THE RACINE AND ENVIRONS SANITARY SEWER SERVICE AREA

AREA TO BE DETACHED FROM THE TOWN OF YORKVILLE SEWER UTILITY DISTRICT NO. 1 SEWER SERVICE AREA AND ATTACHED TO THE RACINE SEWER SERVICE AREA (TIMING TO BE DETERMINED BY LOCAL OFFICIALS)

CITY AND VILLAGE BOUNDARIES

Source: SEWRPC.

SEWRPC Correspondence

Yorkville Div H Fac Plan

COPY

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

916 N. EAST AVENUE • P.O. BOX 1607 • WAUKESHA, WISCONSIN 53187-1607 • TELEPHONE (414) 547-6721 TELECOPIER (414) 547-1103

Serving the Counties of: KENOSHA MILWAUKEE OZAUKEE RACINE WALWORTH WASHINGTON WAUKESHA

November 16, 1993

Mr. Rodney W. Taylor
Project Engineer
RUST Environment & Infrastructure, Inc.
6325 Odana Road
Madison, Wisconsin 53719

Dear Mr. Taylor:

This is to acknowledge receipt of your October 22, 1993, letter, requesting that the Commission review and comment on the proposed sewer service area and associated design loadings which you proposed to use in preparing a facilities plan for the Yorkville Sewer Utility District No. 1. Attached to your letter was a map describing the proposed planned sewer service area with its associated urban land uses and tabular summaries of the urban land uses and design loading information.

Pursuant to your request, the Commission has reviewed the sewer service area and design loadings which you propose to use for facility planning purposes, and offers the following comments for your consideration:

1. The Commission staff has not been provided with a copy of the scope of work for the facility planning which you propose to undertake. In this regard, it is recommended that an alternative be specifically evaluated in the facility planning process which would provide for connection of the Yorkville service area to the Mt. Pleasant-Racine sewerage system as is recommended in the Sanitary Sewerage and Water Supply System Plan prepared for the greater Racine area as documented in the report, <u>A Coordinated Sanitary Sewer and Water Supply System plan, Greater Racine Area</u> and dated September 1992. Under that planning program, it was determined that the most cost-effective alternative for providing service to the Yorkville area, as well as to portions of the Towns of Caledonia and Raymond in the vicinity of IH 94, was to provide for connection of those areas to the City of Racine sewerage system through a trunk sewer which would be constructed generally parallel to and south of STH 20, between Stuart Road and IH 94. This alternative was determined to be more cost effective than upgrading and expanding the Town of Yorkville's Sewer Utility District No. 1 sewage treatment plant. Subsequently, construction work is underway to complete the portion of the needed trunk sewer within the Town of Mt. Pleasant between Stuart Road and 90th Street in the manner recom-

mended in the aforementioned utility system plan. Thus, the cost effectiveness based upon existing conditions would now be even more favorable to an alternative providing for connection to the Racine system.

2. As you are aware, the planned sewer service area which you have proposed to utilize in the facility planning is much larger than the currently adopted planned sewer service area for the Yorkville and Mt. Pleasant area shown on the map attached hereto as Exhibit A. However, the area you have delineated is considered to be generally consistent with the planned sewer service area which was recommended to be adopted as an amendment to the regional water quality management plan under the aforementioned Utility System Plan for the Greater Racine Area. Thus, unless the service area is amended as recommended and shown on Map 6 in the summary of the Greater Racine Area utility system plan report set forth in SEWRPC Newsletter Volume Two, No. 5, September-October 1992, the service area you have proposed for the Yorkville and Mt. Pleasant areas in the vicinity of IH 94 will be in conflict with the adopted regional plan.

3. The sewer service area proposed to be served is also consistent with the land use recommendations developed under the land use plan for the IH 94 South area, as documented in SEWRPC Community Assistance Planning Report No. 200, <u>A Land Use and Transportation System Development Plan for the IH 94 South Freeway Corridor, Kenosha, Milwaukee, and Racine Counties</u>. The areas which you have included in the proposed planned sewer service area include all of those urban land uses identified in the aforementioned planning effort under the intermediate growth land use plan and portions of the areas envisioned to be developed under the high growth land use plan.

4. The recommendations developed under the aforementioned utility system plan for the Greater Racine Area recommended that sanitary sewage generated at urban land use areas in the Towns of Raymond and Caledonia in the vicinity of IH 94 be conveyed southerly to the intersection of IH 94 and STH 20. These flows would be combined with the sewage flows from the Towns of Yorkville and Mt. Pleasant and conveyed easterly via a trunk sewer to the Racine sewerage system. Thus, it is recommended that the facility planning consider the future connection of areas to the north in the Towns of Caledonia and Raymond.

5. The sewage treatment plant loading data were developed based upon the land uses envisioned in the sewer service area as set forth on the map attached to your letter. Review of loading factors used for the individual land uses in the proposed sewer service area indicates that they appear to be reasonable. The total hydraulic loadings from the Yorkville and Mt. Pleasant areas are estimated to be 1.43 million gallons per day. As noted above, consideration should also be given to the future connection of other areas north of the initially proposed service area.

We trust this responds to your request. Should you have any questions, please do not hesitate to call.

Sincerely

Kurt W. Bauer
Executive Director

KWB/ib
Enclosures
Taylor.rpb
cc: Mr. Arnold L. Clement, Racine County

COPY

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

W239 N1812 ROCKWOOD DRIVE • PO BOX 1607 • WAUKESHA, WI 53187-1607 • TELEPHONE (262) 547-6721
FAX (262) 547-1103

Serving the Counties of: KENOSHA MILWAUKEE OZAUKEE RACINE WALWORTH WASHINGTON WAUKESHA

August 19, 2005

Mr. James E. Moyer
Chairman, Yorkville Sewer Utility District No. 1
720 Main Street
Union Grove, WI 53182

Dear Mr. Moyer:

Pursuant to your August 19, 2005, telephone request to Mr. Michael G. Hahn of the Commission staff, we are writing to verify the status of future sanitary sewer service to the approximately 60-acre area near the intersection of STH 20 and IH 94 in the Village of Mt. Pleasant that is currently served by sewers tributary to the Yorkville Sewer Utility District No. 1 sewage treatment plant. The issue of the future addition of that area to the Racine and environs service area is addressed in SEWRPC Community Assistance Planning Report No. 147 (2nd Edition), *Sanitary Sewer Service Area for the City of Racine and Environs, Racine and Kenosha Counties, Wisconsin*, June 2003. That report states that the area in question:

> "will eventually be removed from the Yorkville service area and added to the Racine service area. Wastewater from the area would then be conveyed to the Racine sewage treatment plant. The timing of the transfer depends in part on the extension of a trunk sewer to this area by the Town (now Village) of Mt. Pleasant, and the area will remain in the Town of Yorkville Sewer Utility District No. 1 sewer service area until the transfer. No additional amendment of the respective sewer service area plans will be necessary to effect the transfer."

Therefore, at such time that the trunk sewer extension is complete and connection to the Racine sewer service area is possible, no sewer service area plan amendments would be required. The service area attendant to the Yorkville sewage treatment plant will be refined to reflect the foregoing at such time as a sewer service area plan is prepared at the request of the Sanitary District. However, the Village of Mt. Pleasant would have to make the routine sewer extension conformance request from the Regional Planning Commission that the connection to the Racine system is in conformance and would serve to implement the regional plans prepared and adopted by the Commission. The Commission sewer extension letter documenting those findings would then be provided along with plans and specifications for the connecting sewer extension project that would be submitted to the Wisconsin Department of Natural Resources.

We trust that the foregoing is fully responsive to your request. If you have any further questions, please contact Mr. Hahn directly.

Sincerely,

Philip C. Evenson
Executive Director

PCE/MGH/pk
#111385 V1 - TN YORKVILLE SEWER UTIL DISTR NO 1 LETTER

bcc: William J. Stauber

Connection and Service Cost Analysis

Town of Yorkville Sanitary Sewer Connection and Service Cost Analysis

Recently the Village of Mount Pleasant and Village of Caledonia amended the Mount Pleasant/Caledonia Shared Sanitary Sewer Service Agreement that outlines how Caledonia could connect to the Mt. Pleasant Interceptor sewer (also referred to as the Shared Conveyance System) to provide sewer service to areas of Caledonia. That agreement provides an indication of how communities like the Town of Yorkville might be able to pursue sanitary sewer service to the City of Racine wastewater system through the interceptor sewer. To aid in the understanding of cost items relative to the potential connection of the Town of Yorkville to the Racine wastewater system, AECOM met with the Village of Mount Pleasant Sewer Utility Manager, Tony Beyer and their consultant, Dan Snyder of GAI Consultants as well as the General Manager of the Racine Water and Wastewater Utilities (RWWU), Keith Haas.

The following outlines the conversation held between the parties, identifies connection cost and ongoing service cost items under two potential connection cost scenarios depending on the level of service (peak flow) conveyed/purchased through agreement between the Town and Village. Two levels of service and cost are shown in the following calculations within the discussion. Neither scenario includes any cost for design and construction of the physical pipe connection that would be needed to convey flows from the current Town wastewater treatment plant to the interceptor. The discussion does not estimate additional fees associated with Town costs for legal or other support throughout the connection acquisition process, including direct and indirect costs associated with becoming a party to the Racine Area Intergovernmental Sanitary Sewer Service, Revenue Sharing, Cooperation and Settlement Agreement (Sewer Agreement) nor any costs associated with negotiating and consummating a sewer transport agreement with Mt. Pleasant, similar to the aforementioned agreement that they have with Caledonia for transmission of sewage. Costs could include legal, engineering, and other items such as efforts of the Racine Wastewater Commission's consultant to update related tables of the Sewer Agreement.

Scenario 1: This scenario outlines a cost for the Town of Yorkville to connect to the interceptor sewer that allows for the existing Town wastewater plant to be abandoned and allows for infill of the existing sanitary sewer service area. Table 5 of this Memorandum was used as reference when considering potential flow conveyance needs of the Town and are used in calculations in this section. The table assumes a peaking factor of 4.0 times the average daily flow at the plant to get a peak hourly rate that is estimated that could be conveyed to the interceptor. The actual peaking factor is currently unknown because the flows at the plant are controlled by pumping system and attenuated in the Town's sanitary sewer system under higher flow conditions as the system surcharges and creates in-line storage. Since both low (260,900 gpd + 433,690 gpd = 694,590 gpd) and high flows (318,520 gpd + 1,089,448 gpd = 1,407,968 gpd) were estimated in Table 5, an average of the two would result in 1,051,279 gallons per day. For this analysis, 1.0 mgd will be used to make other estimates more easily scalable.

Scenario 2: This scenario includes conveyance of existing flows, infill, and an expanded service area that anticipates potential growth in the Town. Similar to the discussion in Scenario 1, an average of the low end total flow value (2,594,356 gpd) and high end total flow value (11,788,316 gpd) from Table 5 was calculated and results in 7,191,336 gpd or approximately 7.2 mgd of peak hourly flow from existing, infill, and an expanded sewer service area as outlined previously.

Connection Charge Component

The Village of Caledonia purchased capacity within segments of the shared conveyance system, reserving 16 million gallons per day (mgd) in the newest two mile segment of the interceptor immediately east of Interstate 94 and 1 mgd in the downstream segment of the interceptor. This was done because the newer segment was designed and constructed using higher anticipated design flows than the older segment of the system. The purchase price for this connection was $5,000,000. Based on discussions with the Village, it is assumed that the connection charge component would be prorated depending on the amount of capacity the Town wanted to purchase. Language in the Mount Pleasant/Caledonia amendment indicates that the Village of Mount Pleasant may not offer a more favorable cost agreement to other entities.

Under Scenario 1, the Connection Charge for 1 mgd is assumed to be 1/16th of that of the Village of Caledonia, or $312,500.

Under Scenario 2, the Connection Charge for 7.2 mgd is 7.2/16 of $5,000,000 or $2,250,000.

Racine Cost Allocation Charge Component

This cost component is related to the original Sewer Agreement and the amount of capacity that was reserved for Yorkville within the City of Racine wastewater system. In 2002, an average day capacity of 0.76 mgd was reserved for the Town at a cost of $2,291,592. Since the Town did not enter into the Sewer Agreement, the Racine Wastewater Utility carried the debt and paid the debt service until 2006 when the Village of Mount Pleasant purchased the capacity from the City of Racine. The Village also purchased 0.15 mgd that was reserved for Raymond. A portion of the capacity purchased by Mt. Pleasant was subsequently sold to Raymond and it would need to be confirmed that the Village had and was willing to sell Yorkville the desired capacity. The Village paid for all costs incurred by the Racine Wastewater Commission to the date of purchase and assumed future payments on the debt.

The estimated present worth of this capacity is approximately $3,000,000. It is assumed that the Town would be required to follow a similar path to purchasing the capacity as the Village did, by paying the Village of Mount Pleasant for all costs to them up until the time that the Town reached an agreement with the parties and would also assume future remaining debt service. Because the debt was assumed by Mt. Pleasant and the capacity would have to be transferred from Mt. Pleasant to the Town of Yorkville, the present worth of the transfer and remaining debt service period and amount would need to be calculated. Assuming the previous 2.7% debt allocation to the Town of Yorkville was accurate from reviewing a Clean Water Fund Loan Payment allocation spreadsheet provided by RWWU and loan payment summary, the payment for 2016 would be approximately $160,000. The payment is made in two installments annually and would be made for another 20 years.

Revenue Sharing

Under the Sewer Agreement to provide sanitary sewer service to Sewer Service Recipients (SSR), the SSR municipalities are required to pay a revenue sharing fee to the City of Racine in accordance with the Sewer Agreement. This fee would be paid for a period of 30 years and the Town of Yorkville's current annual payment would be $56,671. That number is recalculated every year for each Sewer Service Recipient based on State of Wisconsin Department of Revenue records.

Future Shared Conveyance System Upgrade Costs

This cost component can only be estimated by reviewing the Storage Optimization Study and the Cost of Services Study (COSS) for the Mt. Pleasant Storage Upstream of KR Lift Station conducted for the Racine Wastewater Utility to evaluate the potential costs associated with expanding the interceptor sewer system and/or providing storage of peak flows. The peak hourly flow originally associated with the allocated treatment capacity of 0.76 mgd allocated to the Town of Yorkville from the original Sewer Agreement was 3.23 mgd. Reviewing the COSS, it is noted that the Mt. Pleasant Storage option is estimated at a cost of $57.1 million. Yorkville is not currently shown in the analysis because they are not currently a member and a direct part of the analysis. However, the manner in which Sturtevant is analyzed as a satellite partner to Mt. Pleasant is similar to the Town's position and it can be assumed that the Town would be treated in a similar prorated fashion. Using flow values from the Storage Optimization Plan, an estimated 2035 peak hour flow rate of 6.0 mgd was estimated for the Town. Comparing that to the original allocation of 3.23 mgd, the future flows are over the original allocation by 2.77 mgd which is similar to the overage noted for Sturtevant of 2.7 mgd. Sturtevant's cost allocation based on that overage was $3.9 million. Since there are a variety of factors that went into the full analysis which cannot be discerned here, a direct proration will be used or 1.03x's that of Sturtevant's cost. This results in $4.02 million cost allocation to Yorkville. It is important to note that this is just an estimate and a detailed analysis would need to be conducted in the future. It is anticipated that storage facilities would be configured to be expandable so that the facility could grow with need and spread the ultimate cost out over a greater timeframe.

Annual Operation and Maintenance Cost Component

As part of the routine operation and maintenance (O&M) of the Shared Conveyance System, the Town would be required to pay a fee in quarterly increments. The fee includes a proration of actual O&M costs of the Village, proration of any debt incurred by the Village (currently $0), prorated depreciation of the interceptor, and an 8% rate of return to the Village. The actual value is calculated annually based on the factors noted and has been stated by the Village to average approximately $500,000 annually. The City of Racine has been paying this fee on areas where the City utilizes portions of the Mount Pleasant sewer conveyance system. A range of $200-$300 per million gallons conveyed was suggested by the Village and a recent quarterly charge of $260/mg was provided.

Under Scenario 1, and using the average values for the low (65,225 +108,422 = 173,647 gpd) and high (79,630 + 272,362 =351,992 gpd) existing and infill flows from Table 5 results in an average daily flow of 262,820 gallons per day or almost 96 million gallons per year. The O&M fee at this level of flow at $260/mg would be $24,960.

Under Scenario 2, an average of low (648,589 gpd) and high (2,947,079) existing, infill, and future development flows results in an average daily flow of 1,797,834 gallons per day or 656.2 million gallons per year. The O&M fee at this level of flow at $260/mg would be $170,612.

City of Racine Wastewater Quarterly Sewer Charge

Treatment of the waste conveyed to the Racine Wastewater Treatment Plant would also incur an ongoing sewer service charge that would be billed quarterly to the Town. This charge is for the treatment of the waste conveyed to the plant from Yorkville. This charge is variable dependent on a number of factors. The published rate for Area C in the Racine Wastewater Utility Class I Charges for 2015 (adopted by 9/23/2014) is $1,311.74/mg. For reference, the 2014 charge was $1,468.61/mg. This is an average of about $1,385/mg over the last two years. These rates for treatment are adjusted annually and the Villages of Sturtevant and Mt. Pleasant currently pay these rates for sewage treatment on a million gallon basis.

Under Scenario 1 and using the flow identified in the Annual O&M calculation noted previously and the average cost for 2014/15 would result in a full annual fee (billed out in quarterly increments) of (96 x $1,385) = $132,960.

Under Scenario 2 and using the flow identified in the Annual O&M calculation noted previously and the average cost for 2014/15 would result in a full annual fee (billed out in quarterly increments) of (656.2 x $1,385) = $908,837.

Summary and Additional Considerations

In summary, there are a number of costs that are common to both Scenario 1 and Scenario 2.

Under the above assumptions, they total approximately $160,000 annually for the next 20 years plus a lump sum to cover the portion of the principle and interest already paid by Mount Pleasant, an annual revenue sharing fee that is estimated at $56,671 for the current year (and is adjusted annually), as well as some future capital cost sharing that is currently estimated at $4.02 million.

Scenario 1 costs include an initial connection charge of approximately $312,500 with current annual costs of $157,920 for operation and maintenance and sewer charges.

Scenario 2 costs include an initial connection charge of approximately $2,250,000 with current annual costs of $1,079,449 for operation and maintenance and sewer charges.

It is important to note that some of the annual charges are flow based and would not be fully realized until the development was in place to create the flows noted in this analysis, but also that many of the charge components are evaluated annually and subject to change.

In addition to the identified costs, there are additional actions/considerations that are likely necessary for the Town to receive sanitary sewer service in addition to joining into the Sewer Agreement. These are as follows:

- Cost to design and construct the physical connection from the Yorkville plant to the interceptor sewer.
- Cost to update the Sewer Agreement documents (By Ruekert and Mielke for the Town and RWWU).
- Flows would need to be measured and quantified. Likely a 5-minute SCADA system compliant with the Racine Wastewater treatment plant’s system.
- A sampling manhole would also be required to periodically check the concentration of the waste.
- All industries in the Town of Yorkville would need to be evaluated to see if they require permitting for discharge greater than normal strength waste.
- The Town would need to adopt the City of Racine sewer ordinances by reference and incorporate such into their ordinance.
- The concentration of chlorides, as well as Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), and Phosphorus (and potentially other parameters) would need to be analyzed.

Appendix J

Present Worth Cost Estimates

YORKVILLE SANITARY DISTRICT NO. 1
FACILITY PLAN

ALTERNATIVE NO. 1 -
UPGRADE YORKVILLE WWTP

COST ESTIMATE SUMMARY

General Description

This alternative considers replacing the existing complete mix activated sludge package plant with a new sequencing batch reactor (SBR) to address the NOVs and long term flow and loading projections.

Summary of Initial Costs

Estimated Construction Cost Without Contingency		$3,044,000
Contingency	25%	$761,000
Estimated Construction Cost Without Markup		$3,805,000
Contractor Overhead & Profit Markup	15%	$570,750
General Conditions	5%	$190,250
Prime Contractor Markup	3%	$114,150
Estimated Construction Cost		**$4,680,150**
Engineering	20%	$936,030
Total Initial Cost		**$5,616,000**

Summary of Annual Costs

Total Annual Cost		$86,817
Life Cycle Analysis		
Interest Rate Per Year	3.375%	
Number of Years	20	
Present Worth Factor	14.375	
Present Worth of Total Annual Cost		**$1,248,000**

Present Worth of Future Costs	**$900,000**
Present Worth of Salvage Value	**$696,000**
Total Present Worth	**$7,068,000**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITY PLAN

ALTERNATIVE NO. 1 -
UPGRADE YORKVILLE WWTP

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)	Service Life	Future Cost at 10 Years	Salvage Value at 20 Years
Structural							
Earthwork	See Detailed Worksheet			$167,906	N/A	$13,347	
Concrete	See Detailed Worksheet			$347,157	50	$85,514	$276,705
Metals	See Detailed Worksheet			$46,100	50		$27,660
Buildings	See Detailed Worksheet			$300,000	50	$218,750	$355,000
Demolition	See Detailed Worksheet			$20,000	N/A		
Process Mechanical & Control Equipment and Major Piping Systems							
Raw Wastewater Pumps	EA	**2**	**$32,500**	$65,000	20		
Grit Removal System	LS	**1**	**$241,800**	$241,800	20		
Xylem ICEAS Equipment	LS	**1**	**$700,000**	$700,000	20		
Aeration Basin Digester Retrofit	LS	**1**	**$50,000**	$50,000	20		
Positive Displacement Blowers	EA	**2**	**$31,250**	$62,500	20		
Influent and Effluent Composite Samp	EA	**2**	**$6,325**	$12,650	20		
Flow Meters	EA	**3**	**$7,800**	$23,400	20		
Digester Diffusers	LS	**1**	**$62,500**	$62,500	20		
Influent Fine Screen	EA	**1**	**$93,750**		20	$93,750	$46,875
Kruger Discfilter Package System	LS	**1**			20	$454,000	$227,000

Total Construction Cost Percentage-Based Estimates	Assumed % of Construction Cost	Initial Cost ($)	Service Life	Future Cost at 10 Years	Salvage Value at 20 Years
Process-Mechanical Piping Systems	15%	$314,852	40	$129,804	$254,779
HVAC & Plumbing	5%	$104,951	20	$43,268	$21,634
Electrical & Controls	20%	$419,803	15	$173,072	$57,691
Non-Structural Sitework & Yard Piping	5%	$104,951	40	$43,268	$84,926

	Initial Cost ($)	Future Cost at 10 Years	Salvage Value at 20 Years
Sub-Total Without Contingency or Markup	$3,044,000	$1,254,774	$1,352,271
Present Worth of Sub-Total	**$3,044,000**	**$900,000**	**$696,000**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITY PLAN

ALTERNATIVE NO. 1 -
UPGRADE YORKVILLE WWTP

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Structural Detail				
Earthwork: Dewatering	ls	1	$25,000	$25,000
Earthwork: Tight Sheeting	sf	900	$30.00	$27,000
Earthwork: Excavation	cy	4,481	$20	$89,619
Earthwork: Underdrain System	sy	243	$4.50	$1,092
Earthwork: Structural Fill	cy	200	$30.00	$6,000
Earthwork: Earth Fill	cy	1920	$10.00	$19,196
Earthwork: Pile Foundation	ft	0	$30.00	$0
Earthwork Total				**$167,906**
Concrete: Footings/Base Slabs	cy	280	$400	$111,844
Concrete: Walls	cy	461	$500	$230,313
Concrete: Interior 12" Walls	lf	0	$250	$0
Concrete: Solid 8" Precast Roof Plank	sf	0	$15	$0
Concrete: Fiber Reinforced Class B	cy	0	$200	$0
Concrete: Floor Slabs	cy	0	$500	$0
Concrete: Structural Slabs	cy	0	$700	$0
Concrete: Miscellaneous	ls	1	$5,000	$5,000
Concrete Total				**$347,157**
Metals: Grating	sf	500	$25	$12,500
Metals: Handrail	lf	208	$75	$15,600
Metals: Stairway	each	2	$9,000	$18,000
Metals: Aluminum Cover	sf	0	$35	$0
Metals: Hatches	ls	0	$2,500	$0
Metals Total				**$46,100**
Building: Insulating Outside of Tanks	sf	0	$0	$0
Building: Tank Coating	sf	0	$0	$0
Building: One-Story (Basement)	sf	0	$200	$0
Building: Two-Story w/ Basement	sf	0	$250	$0
Building: SBR Treatment Building	sf	2,400	$125	$300,000
Building Total				**$300,000**
Demolition: Selective	ls	1	$5,000	$5,000
Demolition: Structural	ls	1	$10,000	$10,000
Demolition: Mechanical	ls	1	$5,000	$5,000
Demolition Total				**$20,000**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITY PLAN

ALTERNATIVE NO. 1 -
UPGRADE YORKVILLE WWTP

ANNUAL O&M COST ESTIMATE

Electrical Costs General Operational Information	Number Operating	Efficiency	Unit Bhp	Estimated Hrs of Operation
Decant Drive Unit	**2**	**90%**	**0.2**	**2,190**
SBR Air Blowers	**1**	**90%**	**20.5**	**8,760**
Waste Sludge Pump	**2**	**90%**	**1.9**	**438**
Submersible Mixer	**2**	**90%**	**4.5**	**2,920**
Grit Pump	**1**	**90%**	**3**	**1,460**
Digester Air Blower	**1**	**90%**	**15**	**4,380**

Electrical Consumption & Cost	Units	Annual Quantity	Unit Cost ($)	Annual Cost ($)
Electricity: Decant Drive Unit	Kw-hr	726	**$0.10**	$73
Electricity: ICEAS Air Blowers	Kw-hr	148,852	**$0.10**	$14,885
Electricity: Waste Sludge Pump	Kw-hr	1,380	**$0.10**	$138
Electricity: Submersible Mixer	Kw-hr	21,541	**$0.10**	$2,154
Electricity: Grit Pump	Kw-hr	3,631	**$0.10**	$363
Electricity: Digester Blower	Kw-hr	54,458	**$0.10**	$5,446

Operating Costs ITEM	Units	Annual Quantity	Unit Cost ($)	Annual Cost ($)
Chemical #1: Polymer	gal	46	**$3.50**	$160
Chemical #2: Aluminum Sulfate (SBR)	gal	3,011	**$2.50**	$7,528

Other Costs ITEM	Units	Annual Quantity	Unit Cost ($)	Annual Cost ($)
Annual MDV Payment	lb	**237.5**	**$53.14**	$12,621
New Operator Labor	hr	**520**	**$35**	$18,200
New Maintenance Labor	hr	**104**	**$35**	$3,640
New Maintenance Expenses	ls	**1**	**$7,000**	$7,000
New Contractual Services	ls	**1**	**$2,500**	$2,500
New Natural Gas Expenses	therm	**12,110**	**$1.00**	$12,110

Total Annual Cost **$86,817**

NOTE: THIS IS A PARTIAL ESTIMATE OF THE COST TO OPERATE AND MAINTAIN THE FACILITIES REQUIRED FOR THIS ALTERNATIVE. THIS ESTIMATE INCLUDES ONLY MAJOR O&M COST ITEMS FOR PURPOSES OF COMPARISON TO OTHER ALTERNATIVES.

YORKVILLE SANITARY DISTRICT NO. 1
FACILITIES PLAN

ALTERNATIVE NO. 2 -
REGIONALIZATION WITH RACINE

COST ESTIMATE SUMMARY

General Description
Alternative 2 considers abandoning the current treatment at the current WWTP and pumping raw wastewater to be treated at the Racine WWTP. This alternative includes capital costs for decommissioning the existing facility, as well as constructing a new lift station and force main to Mount Pleasant. Additionally capital costs for conveyance upgrades in Mount Pleasant and Racine have been estimated, as well as the cost of adding treatment capacity at Racine. Also included are annual O&M imposed by the City of Racine.

Summary of Initial Costs

Estimated Construction Cost Without Contingency		$4,767,000
Contingency	25%	$1,191,750
Estimated Construction Cost Without Markup		$5,958,750
Contractor Overhead & Profit Markup	15%	$893,813
General Conditions	5%	$297,938
Prime Contractor Markup	3%	$178,763
Estimated Construction Cost		**$7,329,263**
Engineering	20%	$1,465,853
Yorkville Share of Mount Pleasant Collection Improvements		$1,750,000
Total Initial Cost		**$10,545,000**

Summary of Annual Costs

Total Annual Cost	$45,816

Life Cycle Analysis

Interest Rate Per Year	3.375%
Number of Years	20
Present Worth Factor	14.375

Present Worth of Annual O&M Costs	**$659,000**
Present Worth of Annual Treatment & Conveyance (Racine/Mt Pleasant)	**$1,238,000**
Present Worth of Future Capital Costs	**$2,786,000**
Present Worth of Salvage Value	**$1,124,000**
Total Present Worth	**$14,104,000**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITIES PLAN

ALTERNATIVE NO. 2 -
REGIONALIZATION WITH RACINE

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)	Service Life	Future Cost at 5 Years	Future Cost at 10 Years	Salvage Value at 20 Years
Structural								
Earthwork	See Detailed Worksheet			$10,000	N/A			
Concrete	See Detailed Worksheet			$10,000	50			$6,000
Metals	See Detailed Worksheet			$0	50			$0
Buildings	See Detailed Worksheet			$0	50			$0
Demolition	See Detailed Worksheet			$50,000	N/A			
Process Mechanical & Control Equipment and Major Piping Systems								
Lift Station	Each	**1**	**$750,000**	$750,000	20			
Sanitary Force Main (6") (ROW)	LF	**17,950**	**$125**	$2,243,750	50			$897,500
Sanitary Force Main (6") (Roadway)	LF	**250**	**$175**	$43,750	50			$17,500
Sampling & Metering Equipment	LS	**1**	**$30,000**	$30,000	10		$30,000	
Bioxide Feed & Storage System	LS	**1**	**$50,000**	$50,000	20			
Casing Pipe (@ WISDOT crossings)	LF	**200**	**$500**	$100,000	50			$40,000

Total Construction Cost Percentage-Based Estimates	Assumed % of Construction Cost	
Process-Mechanical Piping Systems	15%	$493,125
HVAC & Plumbing	5%	$164,375
Electrical & Controls	20%	$657,500
Non-Structural Sitework & Yard Piping	5%	$164,375

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)	Service Life	Future Cost at 5 Years	Future Cost at 10 Years	Salvage Value at 20 Years
Yorkville Share of Mount Pleasant In	LS	**1**	**$1,750,000**	$1,750,000	50	$903,500		$632,450
Yorkville Share of Racine WWTP Improvements	LS	**1**			20	$2,360,000		$590,000
Sub-Total Without Contingency or Markup				$4,767,000		$3,263,500	$30,000	$2,183,450
Present Worth of Sub-Total				**$4,767,000**		**$2,764,000**	**$22,000**	**$1,124,000**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITIES PLAN

ALTERNATIVE NO. 2 -
REGIONALIZATION WITH RACINE

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Structural Detail				
Earthwork: Dewatering	ls	1	$10,000	$10,000
Earthwork: Tight Sheeting	sf	0	$30.00	$0
Earthwork: Excavation	cy	0	$20	$0
Earthwork: Underdrain System	sy	0	$4.50	$0
Earthwork: Structural Fill	cy	0	$30.00	$0
Earthwork: Earth Fill	cy	0	$10.00	$0
Earthwork: Pile Foundation	ft	0	$30.00	$0
Earthwork Total				**$10,000**
Concrete: Footings/Base Slabs	cy	0	$400	$0
Concrete: Walls	cy	0	$500	$0
Concrete: Interior 12" Walls	lf	0	$250	$0
Concrete: Solid 8" Precast Roof Plank	sf	0	$15	$0
Concrete: Fiber Reinforced Class B	cy	0	$200	$0
Concrete: Floor Slabs	cy	0	$500	$0
Concrete: Structural Slabs	cy	0	$700	$0
Concrete: Miscellaneous	ls	1	$10,000	$10,000
Concrete Total				**$10,000**
Metals: Grating	sf	0	$25	$0
Metals: Handrail	lf	0	$75	$0
Metals: Stairway	each	0	$9,000	$0
Metals: Aluminum Cover	sf	0	$35	$0
Metals: Hatches	ls	0	$2,500	$0
Metals Total				**$0**
Building: Insulating Outside of Tanks	sf	0	$0	$0
Building: Tank Coating	sf	0	$0	$0
Building: One-Story (Basement)	sf	0	$200	$0
Building: Two-Story w/ Basement	sf	0	$250	$0
Building: Cake Storage, One-Story on Grade	sf	0	$125	$0
Building Total				**$0**
Demolition: Selective	ls	1	$15,000	$15,000
Demolition: Structural	ls	1	$25,000	$25,000
Demolition: Mechanical	ls	1	$10,000	$10,000
Demolition Total				**$50,000**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITIES PLAN

ALTERNATIVE NO. 2 -
REGIONALIZATION WITH RACINE

ANNUAL O&M COST ESTIMATE

Electrical Costs General Operational Information	Number Operating	Efficiency	Unit Bhp	Estimated Hrs of Operation
New Lift Station No. 1	**1**	**90%**	**8**	**8,760**
Racine Blower Consumption	**1**	**90%**	**20**	**8,760**
Mount Pleasant Pumping	**1**	**90%**	**10**	**8,760**

Electrical Consumption & Cost	Units	Annual Quantity	Unit Cost ($/kW)	Annual Cost ($)
Electricity: New Lift Station No. 1	Kw-hr	54,568	**$0.10**	$5,457
Electricity: Racine Blower Consumption	Kw-hr	145,221	**$0.10**	$14,522
Electricity: Mount Pleasant Pumping	Kw-hr	72,611	**$0.10**	$7,261

Chemical Costs ITEM	Units	Annual Quantity	Unit Cost ($)	Annual Cost ($)
Chemical #1: Bioxide	gal	**1,606**	**$3.00**	$4,818

Other Costs ITEM	Units	Annual Quantity	Unit Cost ($)	Annual Cost ($)
New Operator Labor	hr	**156**	**$35**	$5,460
New Maintenance Labor	hr	**104**	**$35**	$3,640
New Maintenance Expenses	ls	**1**	**$3,750**	$3,750
Yorkville Treatment at Racine	MG	**55.845**	**$1,385**	
Yorkville Shared Conveyance O&M	MG	**55.845**	**$260.00**	
New Natural Gas Expenses	therm	**1,009**	**$0.90**	$908

Total Annual Cost **$45,816**

NOTE: THIS IS A PARTIAL ESTIMATE OF THE COST TO OPERATE AND MAINTAIN THE FACILITIES REQUIRED FOR THIS ALTERNATIVE. THIS ESTIMATE INCLUDES ONLY MAJOR O&M COST ITEMS FOR PURPOSES OF COMPARISON TO OTHER ALTERNATIVES.

YORKVILLE SANITARY DISTRICT NO. 1
FACILITIES PLAN

ALTERNATIVE NO. 2 -

REGIONALIZATION WITH RACINE

CALCULATION OF PRESENT WORTH OF ANNUAL CONVEYANCE AND TREATMENT COSTS

Year	Projected Flow	Conveyance O&M	Treatment at Racine	PW of Annual Conveyance	PW of Annual Treatment
1	0.07	$6,643	$35,387	**$ 6,426**	**$ 34,231**
2	0.079	$7,472	$39,803	**$ 6,992**	**$ 37,247**
3	0.087	$8,301	$44,220	**$ 7,514**	**$ 40,029**
4	0.096	$9,130	$48,637	**$ 7,995**	**$ 42,590**
5	0.105	$9,960	$53,054	**$ 8,436**	**$ 44,940**
6	0.114	$10,789	$57,470	**$ 8,840**	**$ 47,092**
7	0.122	$11,618	$61,887	**$ 9,209**	**$ 49,056**
8	0.131	$12,447	$66,304	**$ 9,544**	**$ 50,841**
9	0.140	$13,276	$70,720	**$ 9,848**	**$ 52,457**
10	0.149	$14,105	$75,137	**$ 10,121**	**$ 53,914**
11	0.157	$14,934	$79,554	**$ 10,366**	**$ 55,219**
12	0.166	$15,763	$83,970	**$ 10,584**	**$ 56,382**
13	0.175	$16,593	$88,387	**$ 10,777**	**$ 57,410**
14	0.184	$17,422	$92,804	**$ 10,946**	**$ 58,311**
15	0.192	$18,251	$97,220	**$ 11,093**	**$ 59,091**
16	0.201	$19,080	$101,637	**$ 11,218**	**$ 59,759**
17	0.210	$19,909	$106,054	**$ 11,324**	**$ 60,320**
18	0.219	$20,738	$110,471	**$ 11,410**	**$ 60,781**
19	0.227	$21,567	$114,887	**$ 11,479**	**$ 61,147**
20	0.236	$22,396	$119,304	**$ 11,531**	**$ 61,425**
Average	0.153	$ 14,520	$ 77,345	$ 9,783	$ 52,112
Sum	55.845	$ 290,394	$ 1,546,907	**$ 195,656**	**$ 1,042,242**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITIES PLAN

ALTERNATIVE NO. 3 -
REGIONALIZATION WITH UNION GROVE

COST ESTIMATE SUMMARY

General Description

This alternative considers abandoning the current treatment at the current WWTP and pumping raw wastewater to be treated at the Union Grove WWTP. This alternative includes capital costs for decommissioning the existing facility, as well as constructing new lift stations and force mains to Union Grove. Also included are annual O&M, and any connection and user fees imposed by the Village of Union Grove.

Summary of Initial Costs

Estimated Construction Cost Without Contingency		$9,931,000
Contingency	25%	$2,482,750
Estimated Construction Cost Without Markup		$12,413,750
Contractor Overhead & Profit Markup	15%	$1,862,063
General Conditions	5%	$620,688
Prime Contractor Markup	3%	$372,413
Estimated Construction Cost		**$15,268,913**
Engineering	20%	$3,053,783
Total Initial Cost		**$18,323,000**

Summary of Annual Costs

Total Annual Cost	$53,102

Life Cycle Analysis

Interest Rate Per Year	3.375%
Number of Years	20
Present Worth Factor	14.375

Present Worth of Total Annual Cost	**$763,000**
Present Worth of Future Capital Costs	**$22,000**
Present Worth of Salvage Value	**$1,467,000**
Total Present Worth	**$17,641,000**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITIES PLAN

ALTERNATIVE NO. 3 -
REGIONALIZATION WITH UNION GROVE

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)	Service Life	Future Cost at 10 Years	Salvage Value at 20 Years
Structural							
Earthwork	See Detailed Worksheet			$0	N/A		
Concrete	See Detailed Worksheet			$10,000	50		$6,000
Metals	See Detailed Worksheet			$0	50		$0
Buildings	See Detailed Worksheet			$0	50		$0
Demolition	See Detailed Worksheet			$45,000	N/A		
Process Mechanical & Control Equipment and Major Piping Systems							
Clearing and Grubbing	LS	**1**	**$25,000**	$25,000	N/A		
Sanitary Sewer (12")	LF	**20,050**	**$150**	$3,007,500	50		$1,804,500
Sanitary Manholes (depth varies)	Each	**60**	**$7,500**	$450,000	50		$270,000
Water Crossing (casing)	Each	**2**	**$125,000**	$250,000	50		$150,000
Lift Station	Each	**2**	**$750,000**	$1,500,000	20		$0
Sanitary Force Main (4 & 6")	LF	**8,250**	**$125**	$1,031,250	50		$618,750
Main Treatment Plant Lift Station Modifications	LS	**1**	**$500,000**	$500,000	20		
Sampling & Metering Equipment	LS	**1**	**$30,000**	$30,000	10	$30,000	

Total Construction Cost Percentage-Based Estimat	Assumed % of Construction Cost	
Process-Mechanical Piping Systems	15%	$1,027,313
HVAC & Plumbing	5%	$342,438
Electrical & Controls	20%	$1,369,750
Non-Structural Sitework & Yard Piping	5%	$342,438

	Initial Cost	Future Cost at 10 Years	Salvage Value at 20 Years
Sub-Total Without Contingency or Markup	$9,931,000	$30,000	$2,849,250
Present Worth of Sub-Total	**$9,931,000**	**$22,000**	**$1,467,000**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITIES PLAN

ALTERNATIVE NO. 3 -
REGIONALIZATION WITH UNION GROVE

INITIAL COST ESTIMATE

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Structural Detail				
Earthwork: Dewatering	ls	0	$10,000	$0
Earthwork: Tight Sheeting	sf	0	$30.00	$0
Earthwork: Excavation	cy	0	$20	$0
Earthwork: Underdrain System	sy	0	$4.50	$0
Earthwork: Structural Fill	cy	0	$30.00	$0
Earthwork: Earth Fill	cy	0	$10.00	$0
Earthwork: Pile Foundation	ft	0	$30.00	$0
Earthwork Total				**$0**
Concrete: Footings/Base Slabs	cy	0	$400	$0
Concrete: Walls	cy	0	$500	$0
Concrete: Interior 12" Walls	lf	0	$250	$0
Concrete: Solid 8" Precast Roof Plank	sf	0	$15	$0
Concrete: Fiber Reinforced Class B	cy	0	$200	$0
Concrete: Floor Slabs	cy	0	$500	$0
Concrete: Structural Slabs	cy	0	$700	$0
Concrete: Miscellaneous	ls	1	$10,000	$10,000
Concrete Total				**$10,000**
Metals: Grating	sf	0	$25	$0
Metals: Handrail	lf	0	$75	$0
Metals: Stairway	each	0	$9,000	$0
Metals: Aluminum Cover	sf	0	$35	$0
Metals: Hatches	ls	0	$2,500	$0
Metals Total				**$0**
Building: Insulating Outside of Tanks	sf	0	$0	$0
Building: Tank Coating	sf	0	$0	$0
Building: One-Story (Basement)	sf	0	$200	$0
Building: Two-Story w/ Basement	sf	0	$250	$0
Building: Cake Storage, One-Story on Grade	sf	0	$125	$0
Building Total				**$0**
Demolition: Selective	ls	1	$15,000	$15,000
Demolition: Structural	ls	1	$20,000	$20,000
Demolition: Mechanical	ls	1	$10,000	$10,000
Demolition Total				**$45,000**

YORKVILLE SANITARY DISTRICT NO. 1
FACILITIES PLAN

ALTERNATIVE NO. 3 -
REGIONALIZATION WITH UNION GROVE

ANNUAL O&M COST ESTIMATE

Electrical Costs General Operational Information	Number Operating	Efficiency	Unit Bhp	Estimated Hrs of Operation
New Lift Station No. 1	**1**	**90%**	**10**	**8,760**
New Lift Station No. 2	**1**	**90%**	**10**	**2,190**
Modified Existing Main Lift Station	**1**	**90%**	**10**	**2,190**

Electrical Consumption & Cost	Units	Annual Quantity	Unit Cost ($/kW)	Annual Cost ($)
Electricity: New Lift Station No. 1	Kw-hr	72,611	**$0.10**	$7,261
Electricity: New Lift Station No. 2	Kw-hr	18,153	**$0.10**	$1,815
Electricity: Modified Existing Main Lift Station	Kw-hr	18,153	**$0.10**	$1,815

Chemical Costs ITEM	Units	Annual Quantity	Unit Cost ($)	Annual Cost ($)
Chemical #1: Bioxide	gal	**3,285**	**$2.75**	$9,034

Other Costs ITEM	Units	Annual Quantity	Unit Cost ($)	Annual Cost ($)
New Operator Labor	hr	**364**	**$35**	$12,740
New Maintenance Labor	hr	**182**	**$35**	$6,370
New Maintenance Expenses	ls	**1**	**$12,250**	$12,250
New Contractual Services	ls	**1**	**$0**	$0
New Natural Gas Expenses	therm	**2,018**	**$0.90**	$1,816

Total Annual Cost **$53,102**

NOTE: THIS IS A PARTIAL ESTIMATE OF THE COST TO OPERATE AND MAINTAIN THE FACILITIES REQUIRED FOR THIS ALTERNATIVE. THIS ESTIMATE INCLUDES ONLY MAJOR O&M COST ITEMS FOR PURPOSES OF COMPARISON TO OTHER ALTERNATIVES.

Conveyance Segment	Total Flow (Original) (MGD)	Original Pipe Diameter in.	Estimated Segment Length ft	Original Cost Per Foot	Total Flow Revised (MGD)	Est. Segment Cost (Original)	Est. Segment Cost (Revised)	1/3 of Total LS all of FM Cost Calculation	Yorkville				Mount Pleasant			
									Original %	Revised Q	Revised %	Revised $	Q	%	Revised %	Revised $
Segment 8 - LCM Sewer	2.4			#DIV/0!	2.4	$3,710,000.00	$3,710,000.00	[redacted]	0.0%	0.00	0.0%	$0.00	2.40	100.0%	100.0%	$3,710,000.00
Segment 7 - Yorkville Connection	10.92	30.00	1320.00	522.7272727	0.8	$690,000.00	$53,000.00	[redacted]	100.0%	0.84	100.0%	$231,000.00	0.00	0.0%	0.0%	$0.00
Segment 6 - Additional TID 5 Area	3.96			#DIV/0!	4.0	$7,220,000.00	$7,220,000.00	[redacted]	0.0%	0.00	0.0%	$0.00	3.96	100.0%	100.0%	$7,220,000.00
Segment 5 - Foxconn Phase 2	7.92			#DIV/0!	7.9	$1,280,000.00	$1,280,000.00	[redacted]	0.0%	0.00	0.0%	$0.00	7.92	100.0%	100.0%	$1,280,000.00
Segment 4 - Yorkville Connection	18.84	42.00	2958.00	652.4678837	8.8	$1,930,000.00	$897,000.00	[redacted]	58.0%	0.84	9.5%	$85,550.54	7.92	42.0%	90.5%	$811,449.46
Segment 3 - Foxconn Phase 1 West of Wisconn Valley Way	19.43	48.00	1850.00	891.8918919	9.3	$1,650,000.00	$794,000.00	[redacted]	56.2%	0.84	8.9%	$70,945.96	8.51	43.8%	91.1%	$723,054.04
Segment 2 - Foxconn Phase 1 Main Site	23.12	48.00	8681.00	722.2670199	13.0	$6,270,000.00	$3,535,000.00	[redacted]	47.2%	0.84	6.4%	$1,519,175.00	12.20	52.8%	93.6%	$3,308,553.89
Segment 1 - Foxconn Phase 3	25.55	48.00	5460.00	745.4212454	15.5	$4,070,000.00	$2,464,000.00	[redacted]	42.7%	0.84	5.4%	$133,038.47	14.63	57.3%	94.6%	$2,330,961.53
KR Lift Station	27			N/A	16.9	$20,800,000.00	$13,031,000.00	$4,343,666.67	40.4%	0.84	4.9%	$214,422.80	16.08	59.6%	95.1%	$12,387,731.60
Force Main (CTH KR and STH 32)	27			#DIV/0!	16.9	$22,280,000.00	$13,958,000.00	$13,958,000.00	40.4%	0.84	4.9%	$689,029.26	16.08	59.6%	95.1%	$13,268,970.74
					TOTALS	**$69,900,000.00**	**$46,942,000.00**				**Total**	**$2,943,000**				**$45,041,000.00**
											Total of Future Costs Only	**$2,653,627**				
											Total of Sunk Costs (Fiscal Only)	**$289,535**				

Green Shaded Cells Denote portions of Improvements that have yet to be constructed and will be included in the Present Worth Cost Analysis

MOUNT PLEASANT TID #5
WASTEWATER CONVEYANCE POTENTIAL COST SHARING
JANUARY 4, 2018

Conveyance Segment	Total Flow (MGD)	Est. Segment Cost	Yorkville			Mount Pleasant		
			Q	%	$	Q	%	$
Segment 8 - LCM Sewer	2.4	$ 3,710,000.00	0.00	0.0%	$0	2.40	100.0%	$3,710,000
Segment 7 - Yorkville Connection	10.92	$ 690,000.00	10.92	100.0%	$690,000	0.00	0.0%	$0
Segment 6 - Additional TID 5 Area	3.96	$ 7,220,000.00	0.00	0.0%	$0	3.96	100.0%	$7,220,000
Segment 5 - Foxconn Phase 2	7.92	$ 1,280,000.00	0.00	0.0%	$0	7.92	100.0%	$1,280,000
Segment 4 - Yorkville Connection	18.84	$ 1,930,000	10.92	58.0%	$1,118,662	7.92	42.0%	$811,338
Segment 3 - Foxconn Phase 1 West of Wisconn Valley Way	19.43	$ 1,650,000	10.92	56.2%	$927,329	8.51	43.8%	$722,671
Segment 2 - Foxconn Phase 1 Main Site	23.12	$ 6,270,000	10.92	47.2%	$2,961,436	12.20	52.8%	$3,308,564
Segment 1 - Foxconn Phase 3	25.55	$ 4,070,000	10.92	42.7%	$1,739,507	14.63	57.3%	$2,330,493
KR Lift Station	27	$ 20,800,000	10.92	40.4%	$8,412,444	16.08	59.6%	$12,387,556
Force Main (CTH KR and STH 32)	27	$ 22,280,000	10.92	40.4%	$9,011,022	16.08	59.6%	$13,268,978
	TOTALS	**$ 69,900,000**			**$24,860,401**			**$45,039,599**

Total includes a 30" Yorkville connection from I-94 to Wisconn Valley Way.
Total does not include potential extension on existing International Drive

97.6%

Foth

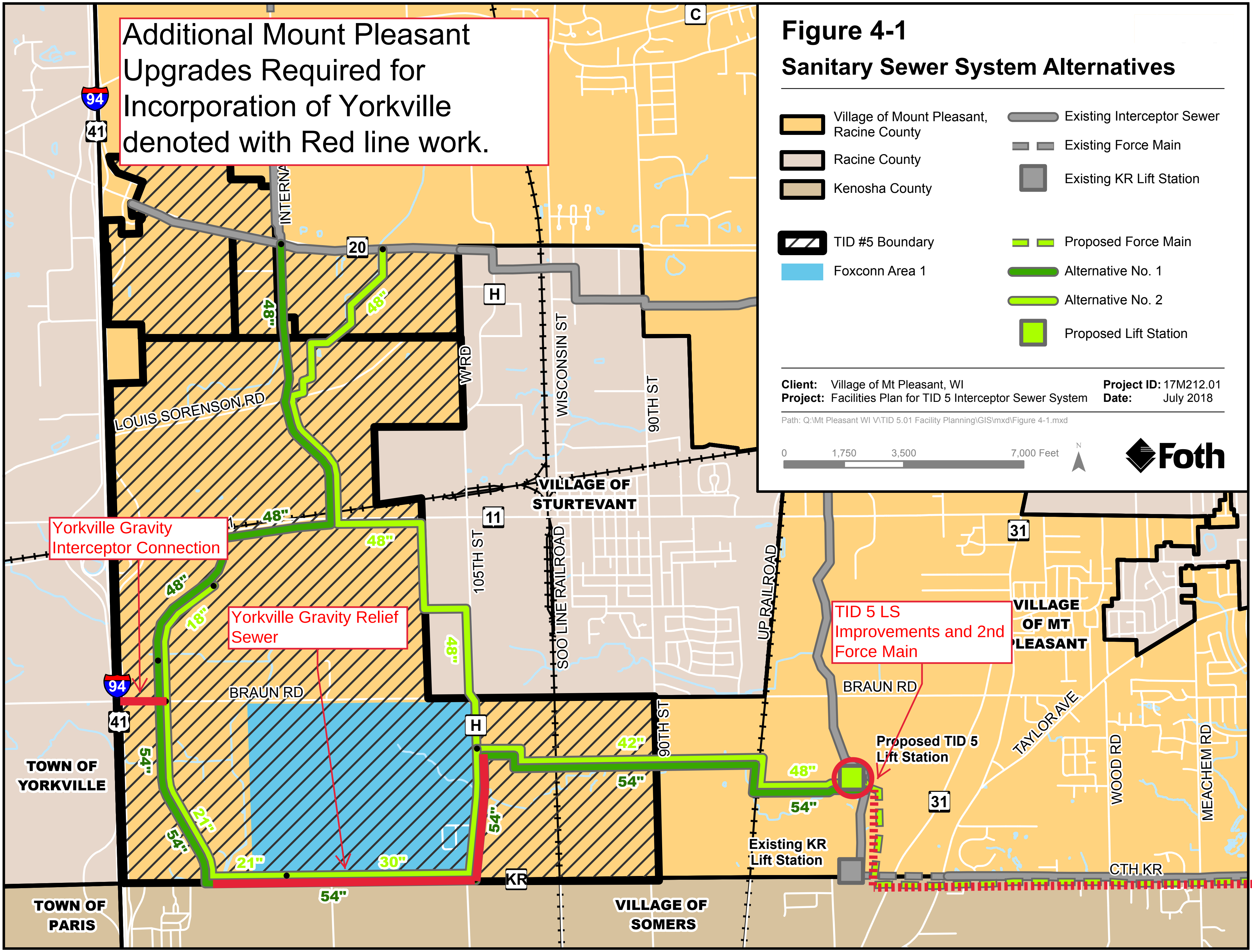


Figure 4-1
Sanitary Sewer System Alternatives
Village of Mount Pleasant, Racine County
Racine County
Kenosha County
TID #5 Boundary
Foxconn Area 1
Existing Interceptor Sewer
Existing Force Main
Existing KR Lift Station
Proposed Force Main
Alternative No. 1
Alternative No. 2
Proposed Lift Station
Client: Village of Mt Pleasant, WI
Project: Facilities Plan for TID 5 Interceptor Sewer System
Project ID: 17M212.01
Date: July 2018
Path: Q:\Mt Pleasant WI V\TID 5.01 Facility Planning\GIS\mxd\Figure 4-1.mxd
0 1,750 3,500 7,000 Feet
N
Foth
Additional Mount Pleasant Upgrades Required for Incorporation of Yorkville denoted with Red line work.
Yorkville Gravity Interceptor Connection
Yorkville Gravity Relief Sewer
TID 5 LS Improvements and 2nd Force Main
Proposed TID 5 Lift Station
Existing KR Lift Station
VILLAGE OF STURTEVANT
VILLAGE OF MT PLEASANT
TOWN OF YORKVILLE
TOWN OF PARIS
VILLAGE OF SOMERS
LOUIS SORENSON RD
BRAUN RD
WRD
WISCONSIN ST
90TH ST
105TH ST
SOO LINE RAILROAD
UP RAILROAD
TAYLOR AVE
WOOD RD
MEACHEM RD
CTH KR
KR
INTERNA
94
41
20
11
H
C
31
48"
42"
54"
30"
21"
18"

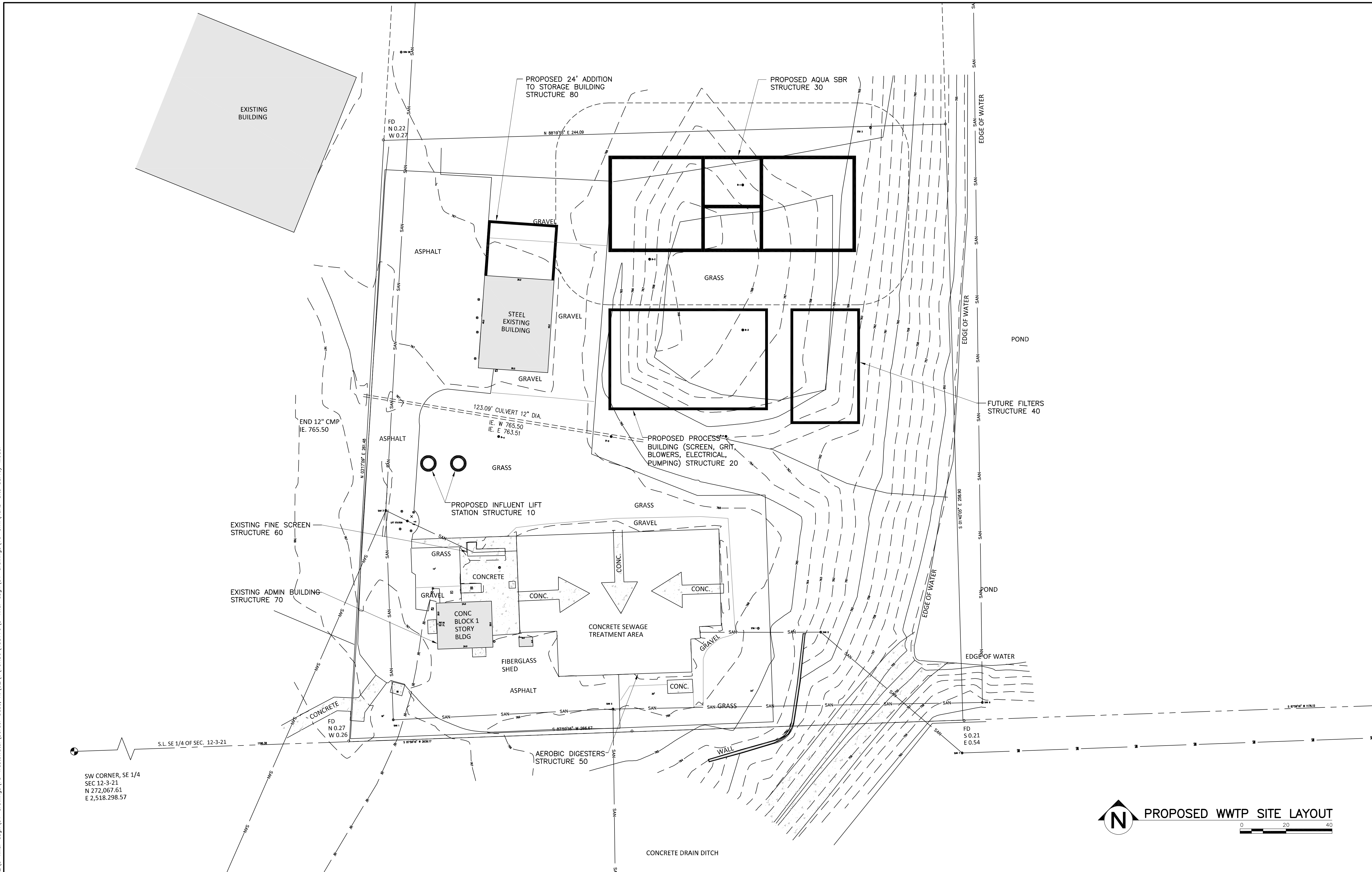
Appendix K

Public Hearing Minutes

Appendix L

Recommended Alternative Site Layout

PLOTTED: 6-12-2020 9:41 AM
PLOT SCALE: 1:2



809 NORTH 8TH ST
SUITE 205
SHEBOYGAN
PHONE: 920.452.6603
FAX: 715.720.6300
WATTS: 800.472.5881
www.sehinc.com

SEH

WWTP IMPROVEMENTS
CONCEPTUAL SITE PLAN
VILLAGE OF
YORKVILLE, WISCONSIN

MARK	DATE	DESCRIPTION

REVISIONS

SEH FILE NO. 153779
PROJECT NO.
ISSUE DATE JANUARY, 2020
DESIGNED BY DLS
DRAWN BY LAP

Short Elliott Hendrickson, Inc. © (SEH)

SHEET TITLE
CONCEPTUAL SITE PLAN

SHEET
C01

X:\UZ\Y\YORSU\153779\5-FINAL-DSGN\51-DRAWINGS\75-WASTEWATER\SITE CONCEPT.DWG
SAVED: 6-12-2020 9:41 AM USER: DYLAN R. DANIELSON
XREFs: Q:\UZ\Y\YORKV\144372\5-final-dsgn\51-drawings\75-WasteWater\border base; X:\UZ\Y\YORSU\153779\5-final-dsgn\51-drawings\10-Civil\ACAD-Site Survey-Model

Appendix M

Preliminary Design Basis Memorandum

PRELIMINARY DESIGN BASIS MEMORANDUM
Yorkville Wastewater Treatment Plant

June 12, 2020

Unit Process	Existing Facilities	Identified Upgrades
RAW WASTEWATER PUMPING		**Construct new Submersible RWW Lift Station**
Number	2	2
Type	Dry Pit Non-Clog Centrifugal	Submersible
Firm Capacity		1 mgd
Total Dynamic Head at Design Point		TBD
INFLUENT SCREENING		Move existing fine screen into new preliminary treatment buidling
Fine Screen		
Number	1	1
Type	Inclined Fine Basket Screen	
Manufacturer	Lakeside	
		1 - Manual trash rack (1/2" spacing)
Channel Width		1 ft
Channel Depth		36 in.
Upstream Channel Velocity		
Design Peak Hour		2 ft/s
Channel Freeboard @ Design Peak Hour Flow		16 in.
Capacity		1 MGD
Motor Size		
Drive		2 HP
Screen Opening		1/4" perforation
Screen Inclination		45 degrees
Screenings Washer/Compactor	Integral to Fine Screen	
GRIT REMOVAL	None	New Stacked Tray Vortex Grit Removal System
Number		1
Acceptable Manufacturer		Hydro International
Removal Performance		95% of grit greater than 106 microns @ Peak Flow
Removal Performance		95% of grit greater than 75 microns @ Avg Flow
Influent Channel Width		1 ft
Chamber Diameter		6 ft diameter
Sidewater Depth		81.00 inches
Capacity		1.084 MGD
Drive Motor HP		1 HP
Grit Pumping Equipment		New Grit Pump
Number		1
Acceptable Manufacturers		WEMCO Or Equal
Type		Recessed Impeller Vortex, Flooded Suction
Capacity		150 gpm 30 ft TDH
Horsepower		7.5 HP
Grit Separator Equipment	None	New
Acceptable Manufacturers		Hydro International
Grit Classifier		New Teacup Washer/Classifier
Number		1
Size		24 inch diameter
Capacity		150 gpm with 39" headloss
Capacity		250 gpm with 108" headloss
Performance		95% separation of >75 micron grit with SG of 2.65 & design flow
Grit Dewatering	None	New Decanter Dewatering Unit
Size		1.5 CY
Performance		>60% total solids and <25% volatile solids
ACTIVATED SLUDGE PROCESS (Sequencing Batch Reactor)		Constuct 2-basin SBR System
Volume of Basins, Mgal.		
Solids Retention Time, days		
Average Annual		
Maximum Month		
Mixed Liquor Concentration (mg/L)		
Average Annual		
Maximum Month		
Volumetric BOD Loading, lbBOD/1000ft3		SEE ATTACHED SBR DESIGN REPORT
Average Annual		
Maximum Month		
WAS PUMPING		
Required Capacity		

Unit Process	Existing Facilities	Identified Upgrades
Min		
Max		
Type		
Acceptable Manufacturers		
Number		
TDH		
Horsepower		
New Pumps		
Capacity		
New Pumps		
Total Firm Capacity (gpm)		
Total Firm Capacity (ft3/s)		
POST SBR EQUALIZATION		
Number	None	1
Type		Rectangular
Length		20 ft
Width		24 ft
Sidewater Depth		13.1 ft
Volume		6288 ft^3
Volume		47,034 gal
Detention Time		54 minutes
Aerated WAS Storage		
Number		1
Type		Reconfigure Original Package Plant Aeration Tanks
Sidewater Depth		Varies ft
Volume		104,211 gal
Detention Time		12 days

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Process Design Report

YORKVILLE WWTP WI

Design# 159847
Option: Preliminary SBR Design

AquaSBR®

Sequencing Batch Reactor

April 09, 2020
Designed By: Corey O'Brien

6306 N. Alpine Rd Loves Park, IL 61111
(815) 654-2501 www.aqua-aerobic.com

Design Notes

Pre-SBR

- Elevated concentration of Hydrogen Sulfide can be detrimental to both civil and mechanical structures. If anaerobic conditions exist in the collection system, steps should be taken to eliminate Hydrogen Sulfide prior to the treatment system.

- Neutralization is recommended/required ahead of the SBR if the pH is expected to fall outside of 6.5-8.5 for significant durations.

- Coarse solids removal/reduction is recommended prior to the SBR.

SBR

- The maximum flow, as shown on the design, has been assumed as a hydraulic maximum and does not represent an additional organic load.

- When flows are in excess of the maximum daily flow of 0.65 MGD, the SBR system has been designed to advance cycles in order to process a peak hydraulic flow of 0.91MGD.

- Depending upon the magnitude and duration of the peak flow, effluent quality may be degraded.

- The decanter performance is based upon a free-air discharge following the valve and immediately adjacent to the basin. Actual decanter performance depends upon the complete installation including specific liquid and piping elevations and any associated field piping losses to the final point of discharge. Modification of the high water level, low water level, centerline of discharge, and / or cycle structure may be required to achieve discharge of full batch volume based on actual site installation specifics.

Aeration

- The aeration system has been designed to provide 1.25 lbs. O2/lb. BOD5 applied and 4.6 lbs. O2/lb. TKN applied at the design average loading conditions.

Digester

- Digester supernatant or sludge dewatering filtrate return to the SBR without chemical addition is not recommended to avoid increasing the SBR influent phosphorus levels due to re-release of phosphorus in the digester.

- The digester will share a common standby blower with the SBR.

Process/Site

- The anticipated effluent NH3-N and Total Nitrogen requirement is predicated upon an influent waste temperature of 10° C or greater. While lower temperatures may be acceptable for a short-term duration, nitrification below 10° C can be unpredictable, requiring special operator attention.

- Sufficient alkalinity is required for nitrification, as approximately 7.1 mg alkalinity (as CaCO3) is required for every mg of NH3-N nitrified. If the raw water alkalinity cannot support this consumption, while maintaining a residual concentration of 50 mg/l, supplemental alkalinity shall be provided (by others).

- To achieve the effluent monthly average total phosphorus limit, the biological process and chemical feed systems need to be designed to facilitate optimum performance.

- A minimum of twelve (12) daily composite samples per month (both influent and effluent) shall be obtained for total phosphorus analysis.

- Influent to the biological system is a typical municipal wastewater application with a TP range of 6–8 mg/l. Influent TP shall be either in a particle associated form or in a reactive soluble phosphate form or in a soluble form that can be converted to reactive phosphorus in the biological system. Soluble hydrolyzable and organic phosphates are not removable by chemical precipitation with metal salts. A water quality analysis is required to determine the phosphorus speciation with respect to soluble and insoluble reactive, acid hydrolyzable and total phosphorus at the system influent, point(s) of chemical addition, and final effluent.

- Chemical feed lines (i.e. metal salts) shall be furnished to each reactor, aerobic digester and dewatering supernatant streams as necessary. Metal salts shall be added to each reactor during the React phase of the cycle.

- pH monitoring of the biological reactor is required when adding metal salts.

Post-SBR

- Provisions should be made by others for a post-equalization basin overflow.

Equipment

- The basin dimensions reported on the design have been assumed based upon the required volumes and assumed basin geometry. Actual basin geometry may be circular, square, rectangular or sloped with construction materials including concrete, steel or earthen.

- Rectangular or sloped basin construction with length to width ratios greater than 1.5:1 may require alterations in the equipment recommendation.

- The basins are not included and shall be provided by others.

- Influent is assumed to enter the reactor above the waterline, located appropriately to avoid proximity to the decanter, splashing or direct discharge in the immediate vicinity of other equipment.

- If the influent is to be located submerged below the waterline, adequate hydraulic capacity shall be made in the headworks to prevent backflow from one reactor to the other during transition of influent.

- A minimum freeboard of 2.0 ft is recommended for diffused aeration.

- Scope of supply includes freight, installation supervision and start-up services.

- The digester system has been designed to fit within (existing, given) basin dimensions.

- The control panel does not include motor starters or VFDs, which should be provided in a separate MCC (by others).

- Aqua-Aerobic Systems, Inc. is familiar with various “Buy American” Acts (i.e. AIS, ARRA, Federal FAR 52.225, EXIM Bank, USAid, PA Steel Products Act, etc.). As the project develops Aqua-Aerobic Systems can work with you to ensure full compliance of our goods with various Buy American provisions if they are applicable/required for the project. When applicable, please provide us with the specifics of the project’s “Buy American” provisions.

AquaSBR - Sequencing Batch Reactor - Design Summary

DESIGN INFLUENT CONDITIONS

Avg. Design Flow	= 0.343 MGD	= 1298 m3/day
Max Design Flow	= 0.65 MGD	= 2461 m3/day
Peak Hyd. Flow	= 0.91 MGD	= 3445 m3/day (with advancing cycles)

DESIGN PARAMETERS

			Effluent			
	Influent	**mg/l**	**Required**	**<= mg/l**	**Anticipated**	**<= mg/l**
Bio/Chem Oxygen Demand:	BOD5	294	BOD5	10	BOD5	10
Total Suspended Solids:	TSS	313	TSS	10	TSS	10
Total Kjeldahl Nitrogen:	TKN	57	--	--	--	--
Ammonia Nitrogen:	--	--	NH3-N	1	NH3-N	1
Total Nitrogen:	--	--	TN	10	TN	10
Phosphorus:	Total P	11	Total P	0.80	Total P	0.8

SITE CONDITIONS

	Maximum		Minimum		Design		Elevation (MSL)
Ambient Air Temperatures:	85 F	29.4 C	10 F	-12.2 C	85 F	29.4 C	750 ft
Influent Waste Temperatures:	68 F	20.0 C	50 F	10.0 C	68 F	20.0 C	228.6 m

SBR BASIN DESIGN VALUES

			Water Depth			Basin Vol./Basin		
No./Basin Geometry:	= 2 Square Basin(s)		**Min**	= 15.3 ft	= (4.7 m)	**Min**	= 0.174 MG	= (658.4 m³)
Freeboard:	= 2.0 ft	= (0.6 m)	**Avg**	= 18.3 ft	= (5.6 m)	**Avg**	= 0.208 MG	= (788.3 m³)
Length of Basin:	= 39.0 ft	= (11.9 m)	**Max**	= 21.0 ft	= (6.4 m)	**Max**	= 0.239 MG	= (904.5 m³)
Width of Basin:	= 39.0 ft	= (11.9 m)						

Number of Cycles:	= 5 per Day/Basin	
Cycle Duration:	= 4.8 Hours/Cycle	
Food/Mass (F/M) ratio:	= 0.064 lbs. BOD5/lb. MLSS-Day	
MLSS Concentration:	= 4500 mg/l @ Min. Water Depth	
Hydraulic Retention Time:	= 1.214 Days @ Avg. Water Depth	
Solids Retention Time:	= 17.1 Days	
Est. Net Sludge Yield:	= 0.873 lbs. WAS/lb. BOD5	
Est. Dry Solids Produced:	= 734.0 lbs. WAS/Day	= (332.9 kg/Day)
Est. Solids Flow Rate:	= 80 GPM (8802 GAL/Day)	= (33.3 m³/Day)
Decant Flow Rate @ MDF:	= 1204.0 GPM (as avg. from high to low water level)	= (76.0 l/sec)
LWL to CenterLine Discharge:	= 3.0 ft	= (0.9 m)
Lbs. O2/lb. BOD5	= 1.25	
Lbs. O2/lb. TKN	= 4.60	
Actual Oxygen Required:	= 1801 lbs./Day	= (817.1 kg/Day)
Air Flowrate/Basin:	= 649 SCFM	= (18.4 Sm3/min)
Max. Discharge Pressure:	= 10.7 PSIG	= (74 KPA)
Avg. Power Required:	= 481.9 KW-Hrs/Day	

POST-SBR EQUALIZATION DESIGN PARAMETERS

Avg. Daily Flow (ADF):	= 0.343 MGD	= (1,298 m³/day)
Max. Daily Flow (MDF):	= 0.65 MGD	= (2,461 m³/day)
Decant Flow Rate from (Qd):	= 1,204 gpm	= (4.6 m³M)
Decant Duration (Td):	= 54 min	
Number Decants/Day:	= 10	
Time Between Start of Decants:	= 144 min	

POST-SBR EQUALIZATION VOLUME DETERMINATION

The volume required for equalization/storage shall be provided between the high and the low water levels of the basin(s). This Storage Volume (Vs) has been determined by the following:

Vs = [(Qd -(MDF x 694.4)] x Td = 40,641 gal = (5,433.3 ft³) = (153.9 m³)

The volumes determined in this summary reflect the minimum volumes necessary to achieve the desired results based upon the input provided to Aqua. If other hydraulic conditions exist that are not mentioned in this design summary or associated design notes, additional volume may be warranted.

Based upon liquid level inputs from each SBR reactor prior to decant, the rate of discharge from the Post-SBR Equalization basin shall be pre-determined to establish the proper number of pumps to be operated (or the correct valve position in the case of gravity flow). Level indication in the Post-SBR Equalization basin(s) shall override equipment operation.

POST-SBR EQUALIZATION BASIN DESIGN VALUES

No./Basin Geometry:	= 1 Rectangular Basin(s)				
Length of Basin:	= 39.0 ft	= (11.9 m)			
Width of Basin:	= 12.0 ft	= (3.7 m)			
Min. Water Depth:	= 1.5 ft	= (0.5 m)	**Min. Basin Vol. Basin:**	= 5,250.9 gal	= (19.9 m³)
Max. Water Depth:	= 13.1 ft	= (4.0 m)	**Max. Basin Vol. Basin:**	= 45,891.9 gal	= (173.7 m³)

POST-SBR EQUALIZATION EQUIPMENT CRITERIA

Mixing Energy with Diffusers:	= 15 SCFM/1000 ft³	
SCFM Required to Mix:	= 92 SCFM/basin	= (156 Nm³/hr/basin)
Max. Discharge Pressure:	= 6.2 PSIG	= (43.11 KPA)
Max. Flow Rate Required Basin:	= 451 gpm	= (1.709 m³/min)
Avg. Power Required:	= 65.8 kW-hr/day	

Aerobic Digester - Design Summary

AEROBIC DIGESTER DESIGN PARAMETERS

Sludge Flowrate to the Digester	= 8,803.3 gal/day	= (33.3 m³/day)
Inlet Sludge Concentration	= 1.00%	
Solids Loading to the Digester	= 734.2 lb/day	= (333.0 kg/day)
Inlet Volatile Solids Fraction	= 73.0%	

AEROBIC DIGESTER BASIN DESIGN VALUES

No./Basin Geometry:	= 2 Rectangular Basin(s)				
Length of Basin:	= 40.5 ft	= (12.3 m)			
Width of Basin:	= 43 ft	= (13.1 m)			
Min. Water Depth:	= 5.6 ft	= (1.7 m)	**Min. Basin Vol. Basin:**	= 72,947.9 gal	= (276.2 m³)
Max. Water Depth:	= 8 ft	= (2.4 m)	**Max. Basin Vol. Basin:**	= 104,211.3 gal	= (394.5 m³)

AEROBIC DIGESTER PROCESS DESIGN PARAMETERS

Solids Retention Time:	= 47.4 days	
Digester Design Temperature:	= 20 C	
Volatile Solids Destruction:	= 40%	
Digester Solids Concentration:	= 2%	
Oxygen Supplied for Digestion:	= 2.00 lbs O2 per lb VSS Destroyed	
Oxygen Distribution Per Basin:	= 100.0%	
Actual Oxygen Required:	= 428.8 lb/day	= (194.5 kg/day)
Volatile Percentage After Digestion:	= 61.9%	
Estimated Dry Solids to be Removed:	= 519.8 lb/day	= (235.8 kg/day)
Volume of Solids to be Removed:	= 3,116.4 gal/day	= (11.80 m³/day)
Estimated Supernatant Volume:	= 31,263.4 gal/basin	= (118.34 m³/basin)
Assumed Supernatant Duration:	= 180 minutes	
Calculated Supernatant Flow:	= 173.7 gpm	= (11.0 l/sec)

1. The Volatile Solids Destruction listed above shall be used for determination of the oxygen demand during summer conditions. It should be noted that the actual VSS destruction will be dependant upon digester inlet condition, temperature, and operating conditions.
2. The Digester Solids Concentration is reflected as an average concentration, assuming the operations include frequent settling and supernating practices.

AEROBIC DIGESTER EQUIPMENT CRITERIA

SCFM Required for O2 Demand:	= 603/basin	= (1,025 m³/hr/basin)
Max. Discharge Pressure:	= 4.03 PSIG	= (27.83 KPA)
Mixing Energy with DDMs	= 40 HP/MG	= (7.88 W/m³)
NPHP Provided:	= 5	= (3.7 kW)
Max. Flow Rate Required Basin:	= 80 gpm	= (0.303 m³/min)
Avg. Power Required:	= 580.29 kW-hr/day	

AquaSBR

Influent Valves

2 Influent Valve(s) will be provided as follows:

- 8 inch diameter Milliken 601 electrically operated eccentric plug valve(s) with 125# flanged end connection, ASTM A-126 Class B cast iron body with welded in nickel seat, EPDM coated ductile iron plug, assembled and tested with an Auma, 115 VAC, 60 hertz, single phase open/close service electric actuator. Valve actuator includes compartment heater.

Mixers

2 AquaDDM Direct Drive Mixer(s) will be provided as follows:

- 7.5 HP Aqua-Aerobic Systems Endura Series Model FSS DDM Mixer(s).

Mixer Mooring

2 Mixer pivotal mooring assembly(ies) consisting of:

- 304 stainless steel pivotal mooring arm(s).
- #12 AWG-four conductor electrical service cable(s).
- Electrical cable strain relief grip(s), 2 eye, wire mesh.

2 Mixer De-Watering Support(s) will be provided as follows:

- Galvanized steel support angle(s).
- Stainless steel anchors.

Decanters

2 Decanter assembly(ies) consisting of:

- 6x4 Aqua-Aerobics decanter(s) with fiberglass float, 304 stainless steel weir, galvanized restrained mooring frame, and painted steel power section with #14-10 conductor power cable wired into a NEMA 4X stainless steel junction box with terminal strips for the single phase, 60 hertz actuator and limit switches.
- 8 inch diameter decant hose assembly.
- 4" schedule 40 galvanized steel mooring post.
- 8 inch electrically operated butterfly valve(s) with actuator.

Transfer Pumps/Valves

2 Submersible pump assembly(ies) consisting of the following items:

- 2.4 HP Submersible Pump(s) with painted cast iron pump housing, discharge elbow, and multi-conductor electrical cable.
- 3 inch diameter plug valve(s).
- 3 inch diameter swing check valve.
- Galvanized upper guide bar bracket(s).
- Guide bar(s).

Retrievable Fine Bubble Diffusers

6 Retrievable Fine Bubble Diffuser Assembly(ies) consisting of:

- 20 diffuser tubes consisting of two flexible EPDM porous membrane sheaths mounted on a rigid support pipe with 304 stainless steel band clamps.
- 304 stainless steel manifold weldment.
- 304 stainless steel leveling angles.
- 304 stainless steel leveling studs.
- Galvanized vertical support beam.
- Galvanized vertical air column assembly.
- Galvanized upper vertical beam and pulley assembly.
- Galvanized top support bracket.

- 3" EPDM flexible air line with ny-glass quick disconnect end fittings.
- Galvanized threaded flange.
- 3" manual isolation butterfly valve with cast iron body, EPDM seat, aluminum bronze disk and one-piece steel shaft.
- Ny-glass quick disconnect cam lock adapter.
- 304 stainless steel adhesive anchors.
- Brace angles.

1 Diffuser Electric Winch(es) will be provided as follows:

- Portable electric winch.

<u>Positive Displacement Blowers</u>

2 Positive Displacement Blower Package(s), with each package consisting of: 3 Blowers?

- Aerzen 30HP Rotary Positive Displacement Blower(s).
- 6" manual butterfly valve(s).

<u>Air Valves</u>

2 Air Control Valve(s) will be provided as follows:

- 6 inch electrically operated butterfly valve(s) with actuator.

<u>Level Sensor Assemblies</u>

2 Pressure Transducer Assembly(ies) each consisting of:

- Submersible pressure transducer(s).
- Mounting bracket weldment(s).
- Transducer mounting pipe weldment(s).

2 Level Sensor Assembly(ies) will be provided as follows:

- Float switch(es).
- Float switch mounting bracket(s).
- Stainless steel anchors.

<u>AquaSBR: Post-Equalization</u>

<u>Transfer Pumps/Valves</u>

2 Submersible Pump Assembly(ies) consisting of the following items:

- 5 HP Submersible Pump(s) with painted cast iron pump housing, discharge elbow, and multi-conductor electrical cable.
- 6" Manual plug valve(s).
- 6 inch diameter swing check valve.
- Guide bar(s).

<u>Fixed Coarse Bubble Diffusers</u>

1 Aqua-Aerobic's Fixed Coarse Bubble Diffuser System(s) consisting of the following components:

- PVC diffuser(s).
- Schedule 40 galvanized steel riser pipe(s).
- Schedule 40 PVC manifold piping.
- Stainless steel anchors.

<u>Positive Displacement Blowers</u>

1 Positive Displacement Blower Package(s), with each package consisting of:

- Aerzen 5 HP motor with slide base.

Level Sensor Assemblies

1 Pressure Transducer Assembly(ies) each consisting of:

- Submersible pressure transducer(s).
- Mounting bracket weldment(s).
- Transducer mounting pipe weldment(s).

1 Level Sensor Assembly(ies) will be provided as follows:

- Float switch(es).
- Float switch mounting bracket(s).
- Stainless steel anchors.

AquaSBR: Aerobic Digester

Supernatant Withdrawal

2 Telescoping supernatent valve(s) will be provided, each consisting of:

- 4 inch diameter Telescoping valve(s).

Transfer Pumps/Valves

2 Submersible pump assembly(ies) consisting of the following items:

- 2.4 HP Submersible Pump(s) with painted cast iron pump housing, discharge elbow, and multi-conductor electrical cable.
- 3 inch diameter plug valve(s).
- 3 inch diameter swing check valve.
- Guide bar(s).
- Galvanized upper guide bar bracket(s).

Fixed Coarse Bubble Diffusers

2 Aqua-Aerobic's Fixed Coarse Bubble Diffuser System(s) consisting of the following components:

- PVC diffuser(s).
- Schedule 40 galvanized steel riser pipe(s).
- Schedule 40 PVC manifold piping.
- Stainless steel anchors.

Positive Displacement Blowers

2 Positive Displacement Blower Package(s), with each package consisting of:

- Aerzen 20HP Rotary Positive Displacement Blower(s).
- 6" manual butterfly valve(s).

Level Sensor Assemblies

2 Pressure Transducer Assembly(ies) each consisting of:

- Submersible pressure transducer(s).
- Mounting bracket weldment(s).
- Transducer mounting pipe weldment(s).

2 Level Sensor Assembly(ies) will be provided as follows:

- Float switch(es).
- Float switch mounting bracket(s).
- Stainless steel anchors.

Controls

Controls wo/Starters

1 Controls Package(s) will be provided as follows:

- NEMA 12 panel enclosure suitable for indoor installation and constructed of painted steel.

- Fuse(s) and fuse block(s).
- Compactlogix Processor.
- Operator interface(s).
- Remote Access Ethernet Modem.

IntelliPro

Instrumentation

1 IntelliPro® Process Control System will be provided as follows:

- Aqua-Aerobic Systems'' IntelliPro® Process Management System software for enhanced biological process monitoring, control and automated optimization.
- Desktop PC with flat panel monitor, keyboard, mouse, and modem. Windows Operating System.
- Color inkjet printer.
- Uninterrupted power supply.
- SQL Server software.
- Snag-It software.
- FactoryTalk View Studio for Machine Edition software.
- High speed internet connection with recommended minimum download and upload speeds of 1 MB/s shall be available (by others). A fixed IP address is required from the internet service provider. Influent flow meter signal shall be available directly hardwired to the control panel. If direct hardwire signal is not available, the current flow rate and daily total flow shall be available over the communication network.
- Hach SC1000 probe module(s) with Modbus communication.
- Hach SC1000 probe module(s).
- Hach SC1000 display module.
- Modbus communication module(s).
- FRP enclosure(s) for SC1000 Display.
- Hach LDO dissolved oxygen probe with replaceable sensor cap and electric cable. Probe includes stainless steel stationary bracket and retrievable pole probe mounting assembly. One (1) probe per basin.
- Hach pHD sc digital differential pH sensor. Sensor constructed of PEEK material with the convertible body style. Sensor includes integral temperature monitoring sensor and electric cable. Probe includes stainless steel stationary bracket and retrievable pole probe mounting assembly. One (1) probe per basin.
- Hach Solitax ts-line sc stainless steel immersion probe with stainless steel wiper and 33 ft electric cable. Probe includes mounting kit. One (1) probe per basin.
- Hach Ammonium NH4D SC Sensor probe. The probe is continuous-reading probe utilizing ion-selective electrode (ISE) technology, and provides reagent-free operation and includes a self-cleaning device. Probe includes stainless steel stationary bracket and retrievable pole probe mounting assembly. One (1) probe per basin.
- Hach Nitratax, 2 mm path length, nitrate probe. The probe is a continuous-reading probe utilizing UV absorption technology, and provides reagent-free operation and includes a self-cleaning device. Probe includes stainless steel stationary bracket and retrievable pole probe mounting assembly. One (1) probe per basin.
- Hach Phosphax SC Ortho-Phosphate Analyzer. The analyzer includes an ASA UV-resistant, lockable housing, rated to IP55. It features automatic cleaning, calibration and adjustable Extensive self-diagnostics. One (1) Analyzer per basin.
- Guide rail system with chain, mounting brackets, and anchors.
- Hach pHD sc digital differential ORP sensor. Sensor constructed of PEEK material with the convertible body style. Sensor includes integral temperature monitoring sensor and 33 ft electric cable. Probe includes stainless steel stationary bracket and retrievable pole probe mounting assembly. One (1) probe per basin.
- Hach SC1000 probe module(s).
- RSLOGIX 500 programming software.
- Panel Builder configuration software.

Building a Better World for All of Us®

Sustainable buildings, sound infrastructure, safe transportation systems, clean water, renewable energy and a balanced environment. Building a Better World for All of Us communicates a companywide commitment to act in the best interests of our clients and the world around us.

We're confident in our ability to balance these requirements.